AIR FORCE JOURNAL of LOGISTICS

FALL
1982

"The restrictions imposed on military operations by supply deficiencies were immediately revealed in 1775. Although prewar preparations had been undertaken, at best they were limited in scope, and they were wholly inadequate to meet wartime demands."

Supplying Washington's Army by Erna Risch

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Quote on front cover: *Supplying Washington's Army* by Erna Risch

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Contracting and Its Future in Logistics

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"The chattering banks of typewriters will fall silent. The file cabinets will shrink away. . . . The sequential movement of papers back and forth across many desks, the endlessly repetitious typing of columns of numbers—all this will become less important and the making of discretionary decisions more important, and more widely shared."

A. Toffler, *The Third Wave*, p. 370.

Introduction

Toffler's predictions invoke mixed emotions—joy at the relief from repetitive drudgery and apprehension for the changes ahead. Dynamic changes will occur in contracting offices where documents such as requisitions, solicitations, and contracts are the hub of activity. Toffler says we will need "men and women who accept responsibility, who understand how their work dovetails with that of others, who can handle ever larger tasks, who adapt swiftly to changed circumstances, and who are sensitively tuned in to the people around them." Ideally, I would like us to have paperless contracting offices.

We in the fields of contracting and manufacturing are working to develop tools to better support Air Force logistics by improving the way we contract. The impetus for some of these changes comes from the Federal level while the rest stems from Department of Defense (DOD) and Air Force actions. The Reagan Administration has given top priority to reforming the way we contract.

Federal Initiatives

Changes are in motion at the Federal level to alter how we write and administer contracts. A key initiative (mandated by Congress under Public Law 96-83) involves the establishment of a *Uniform Federal Procurement System* for all agencies of the Federal Government. The goals are: simplify the Federal process, make it more responsive, make business decisions early, expand competition, and enhance professionalism of the work force. The new system is a dramatic change from the way DOD accomplishes contracting. One reason for the new system, led by OMB's Office of Federal Procurement Policy, is to develop "standard contracts and contract language in order to reduce the Government's cost of procuring goods and services as well as the private sector's cost of doing business with the Government." Other reasons center on the expanded use of buying commercial products with more reliance on using commercial trade practices. Performance specifications will be used to facilitate buying commercial products. The only exception will be when not using performance specifications is authorized.

"We will also rely more on life cycle costs and less on low bids in making contract awards."

If you stop to consider how much is bought today using military specifications and standards, you would realize that the new system should have a tremendous impact on logistics. We will now need to describe what is required to be done rather than the item(s). We also will rely more on life cycle costs and less on low bids in making contract awards. This means "loggies" must thoroughly analyze logistics life cycle costs and identify needs.

Of the initiatives at the Federal level, the first to be put into practice is a Government-wide procurement directive, the Federal Acquisition Regulation (FAR). Today, there are two separate directives. The Department of Defense (DOD) uses the Defense Acquisition Regulations (DAR) while most other Government agencies use the Federal Procurement Regulations (FPR). Efforts to combine the DAR and FPR began in 1978, and a transition is planned for the DOD to use the FAR in mid-1983.

Since the Carter Administration, there has been emphasis on publishing regulatory material in an easy-to-read style. The FAR is expected to conform to this practice. The DOD will be one of the agencies designated to maintain and implement the FAR. The DAR will thus remain indefinitely with its defense-peculiar policies and procedures. With the other services and DLA, we expect to develop both FAR and Defense implementation guidance. We will also issue supplementary guidance for using the FAR and continue the practice of issuing DAR supplements.

There will still be problems training personnel to use the new regulations because legal interpretations will have to be established.

DOD/USAF Initiatives

The DOD leader to reform the acquisition process is Frank C. Carlucci, Deputy Secretary of Defense. While many of his initiatives focus on developing and buying weapon systems, several will affect logistics contracting.

Multiyear Contracting

Multiyear contracting is a dramatic and welcome departure from our old way of doing business. Some of the advantages are: we can make use of prices based on economies of scale from production; industry is more willing to invest capital to produce; buys can be stabilized; and we experience reduced costs.

In 1982, the Air Force has identified several contract programs for multiyear funding. These programs include the F-16 aircraft, Defense Support Satellites, and the AN/TRC-170 radio. Candidates for 1983 include the NAVSTAR Global Positioning System, the Defense Meteorological Support Program, and possibly the F-15 and KC-10 programs. We have formed a Multiyear Steering Group at the Air Staff level to implement the new policies and to review candidate programs for FY84 and beyond.

While some people consider multiyear contracting to be a cure for many acquisition problems, caution must be used. Not all programs are suited to multiyear buys. More funding is

required to cover start-up costs than in single-year buys. Yet, in spite of these problems, the importance of this contracting method in realizing overall savings cannot be overlooked.

In addition to affecting AFSC's major systems buys, AFLC can contract on a multiyear basis for repetitive logistics requirements. Forklifts, cargo pallets, and air conditioners are examples of equipment now being purchased with multiyear contracts. Also, multiyear contracts are suited for base-level services in the United States.

While multiyear contracts in logistics may not always achieve large cost benefits, their use can provide stable production runs, stimulate investment in modern manufacturing techniques, increase competition through larger buys, and provide a useful surge base.

Congress therefore has given us new legislation that permits contracting for logistics requirements using multiyear procurement. I urge logisticians to use this powerful contracting technique.

Contracting

Competition is a basic tenet to the contracting process. While competition has always been a cornerstone of Air Force purchasing, the percentage of dollars competitively awarded has been declining over the past decade. For example, in the early to mid-1970's, about 40% of USAF dollars were contracted competitively. In the last few years, this has fallen closer to 30%. Since several major systems are being bought without competition, a major challenge to reverse this trend faces logistics and contracting managers. Because Congress often equates noncompetitive contracting with waste and inefficiency, we are sure to be criticized if we do not.

Competition is a tool with several uses; it can result in lower prices, better performance, and fairness in awarding contracts. We recently set goals for major commands and agencies to increase their levels of competitive awards. These goals have been expressed as a percentage of the total contract dollars to be awarded based on past achievements and the amount of planned improvement.

The OSD recently adopted a new idea called the "Advocate for Competition." The "advocate" reviews proposed noncompetitive contracts to insure competitive alternatives have been considered. The advocate will not be a "contracting" individual but will be from an activity responsible for determining requirements. Advocates will see that competition is not inhibited by poor planning or unnecessary restrictive requirements. DOD is also identifying commodities and programs which offer the greatest opportunity for competition. The results of this study are expected later this year.

". . . more manufacturing data available for buying spares competitively and less reliance on prime contractors and original equipment manufacturers."

"Leader-follower" and "dual-sourcing" are two techniques also being used wherever possible in the production of selected new systems. Under appropriate circumstances, these techniques can result in making available competitive sources for needed equipment both during production and deployment. We are also attempting to improve the acquisition, management, and use of reprocurement data. Areas such as the determination of data requirements, data inspection criteria, the Air Force's right to transfuse manufacturing data to other sources, and other aspects of data management are being reviewed. The expected result is more manufacturing data available for buying spares competitively and less reliance on prime contractors and original equipment manufacturers.

More competition can be expected in the future from foreign industry as a result of Memorandums of Understanding with NATO countries, foreign military sales offset agreements, and coproduction arrangements on specific weapons systems. Additionally, more competition will result from the Trade Agreements Act of 1979. This Act facilitates competition for "eligible products" from designated countries who agree to eliminate discriminatory buying practices and adopt a Government procurement code. When evaluating offers for eligible products from these countries, the provisions of the "Buy American Act" are waived. Consequently, you will likely see parts from foreign sources shipped from the Defense Logistics Agency as a result of increased foreign participation and competition. The following are a few eligible products, identified by Federal Stock Classification (FSC), where competition from Europe and Japan is expected: Plumbing, Heating and Sanitation Equipment (FSC 45), Valves (FSC 48), Measuring Tools (FSC 52), and Office Machines (FSC 74).

Streamlining the Process

We are dedicated to reducing paperwork and complexity to make buying simpler and faster for both the Government and its contractors. The FY82 DOD Authorization Act aided this initiative by increasing the amount of dollars and contracts that can use less involved contracting procedures.

The ceiling for "small purchase" procedures, for example, was raised from $10,000 to $25,000 for DOD purchases. This new ceiling allows the services to use simplified purchasing rules for requirements under $25,000. Purchases from $10,000 to $25,000 previously required award of a formal contract which was a time-consuming and complex process. Now contracts may be awarded quickly by use of a purchase order or other non-complex document.

We will realize several benefits from this new ceiling. First, since more purchases will use simplified procedures, the contracting function will be more efficient. Second, shorter contracting lead time required for simplified purchases means that you will get what you need faster. Third, because an order is easier to understand and has less complex terms and conditions, more vendors are expected to be interested in offering their products. This increased interest can mean faster deliveries and, in the long run, reduced costs to us.

The FY82 DOD Authorization Act also raised from $100,000 to $500,000 the dollar level where Government contracting officers are required to obtain certified cost and pricing data from defense contractors in noncompetitive acquisitions. This eliminates a tremendous amount of paperwork for both the Air Force and its contractors, and will substantially reduce the contracting lead time for a significant number of purchases. DOD intends to seek a similar increase in thresholds for the socioeconomic programs implemented through the defense contracting process.

Finally, the Air Force has been asked by DOD to take the lead in simplifying solicitations and contracts, in increasing industry participation, and in reducing the time and cost of contracting. Efforts will be made to reduce complex documents by using a more logical and readable format. We have received a blanket authorization to deviate from the Defense Acquisition Regulations to get this project started. Field activities have been asked to submit ideas for testing.

Contracting Out

Logisticians have long been interested in "contracting out" to industry functions previously performed in-house. Each year a number of activities are reviewed to determine if they can be accomplished more economically by the private sector. Contracting out becomes more attractive as we examine ways to reduce manpower costs and associated capital investment without jeopardizing the mission. Currently, the percentage of manpower resources when comparing military and in-house civilian authorizations versus contractor man-year equivalents for commercial activities is approximately 91% for in-house manpower versus 9% for contract man-year equivalents. Contractor man-year equivalents are defined as the number of in-house manpower resources we would require if we were to perform these activities in-house. Over the last three years, several hundred cost comparison studies have been performed that led to more than 70% of the functions studied to be contracted out, at a cost avoidance of more than $250 million.

There is a limit to contracting out based on readiness considerations and other factors. Nevertheless, the number of spaces the Air Force plans to contract out will increase in the future. The DOD has in turn directed that the Air Force study the possible conversion of some 20,000 civilian positions to contractual slots over the next five years.

The extent of contracting out varies base by base. In some cases, many different "contracted out" functions are under one contract (e.g., Operations and Maintenance at Vance AFB). In other cases, prime Air Force missions are contracted out, and they affect many installations (e.g., Operations and Maintenance at the Distant Early Warning Line across the northern frontier of North America). More commonly, contractors perform specialized functions (e.g., food service mess attendants, commissary shelf stocking) at an Air Force base.

"Contracting out is a mixed blessing."

Contracting out is a mixed blessing. It creates significant additional workload for logisticians who are involved in selecting a contractor as well as writing and administering a workable contract. In overseeing a contractor, we must allow him to operate innovatively and efficiently, while insuring our performance standards are met. Our quality assurance evaluators must not only possess in-depth knowledge in their functional area, but also must have a great deal of poise and knowledge in dealing with contractors.

For this reason, we are spending a great deal of time working with functional logistics specialists to develop performance-oriented work statements (using Air Force Regulation 400-28) to state what is to be done and to what standard (not how it is to be done). Additionally, since competition for service contracts by industry is fierce, we are looking at source selection guidelines to get the most for our money.

Unquestionably, the trend for the future is that more logisticians will be involved with contractors performing vital Air Force functions. Our commanders and functional chiefs must acquire new perspectives and skills in managing and accomplishing missions with a mixed "blue suit" and contractor work force. The Air Force-contractor team's performance will be critical in insuring that contracted functions are done efficiently and effectively.

Productivity Enhancement Through Automation

The Air Force is taking steps to upgrade the existing Customer Integrated Automated Purchasing System (CIAPS) into a new system. The primary goal of this effort is to improve the productivity of the base contracting work force. Better productivity also means that our customers get what they want faster. The new system and equipment are planned to be compatible with the Phase IV Program hardware which will replace the UNIVAC 1050-II and Burroughs 3500 base-level computers.

Some of the features of the new system are "user friendly" microprocessor terminals and high- and low-speed printers in an on-line environment. The new system will eliminate batch-processed punched cards and massive paper listings. Data on awards, requisitions, etc., will be input only once to satisfy a variety of requirements. Errors will be displayed on the terminals as they occur, which will permit rapid correction, reduce file maintenance, and improve accuracy. Management reports will be automatically produced at the selected stations within the base contracting office. Eventually, software for pricing, contract administration, and other programs will be developed to assist base-level contracting.

Automated communications between base-level subsystems will take place through a central mainframe and subsystem processors in a network environment. Initially, the feasibility of an interface between contracting and accounting and finance systems will be explored. The long-term goal is to interface with the subsystems of customers such as in the base supply, medical materiel, and civil engineering functions. This communications link will allow automatic processing of requisitions, status requests, and other actions throughout the network.

The new system will emphasize simplicity of operation and more direct usefulness in the actual performance of the contracting function. Prototyping will begin on an upgraded system in 1982 with installation of validated improvements targeted for 1984.

Conclusion

These are but a few changes which lie over the horizon for contracting. Procurement reforms will accelerate in the future and will offer more challenges for us. Overall, there are several underlying threads running throughout the contracting initiatives which do provide the blueprint for the future:

- Reducing the use of paper documents.
- Simplifying the process.
- Describing our needs in a way that maximizes competition and efficiency in industry.
- Interacting closely with our logistics counterparts.

Accomplishing these goals will require far greater use of judgment by everyone at the working level. We in the contracting community cannot fulfill these goals alone. We need cooperation from everyone in Air Force Logistics.

Logistics Information "Management Support" System

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Abstract

A new program, the Logistics Information "Management Support" System (LIMSS), is being developed to integrate existing and planned logistics and engineering digital processing systems. The goal of the program is to network various forms of information processing using state-of-the-art technology. Implementation will be accomplished through systems development—a series of small projects to identify and then to integrate the individual elements of the whole information flow.

Introduction

The Deputy Chief of Staff, Logistics and Engineering, has initiated an Air Force-wide program for rapidly expanding the use of electronic information processing technology into all logistics areas before the end of this decade. This program is called the Logistics Information "Management Support" System. Its goal is to use digital electronic processing systems to move information throughout all the primary functions of AF retail and wholesale logistics before 1990.

This article will outline the LIMSS concept and discuss one of its major subelements, the Logistics Command, Control, and Communications (Log-C3) component of the European Distribution System.

Background

The current logistics information system is encumbered with numerous processes that require manual manipulation of information. We use forms, letters, messages, punch cards, magnetic tapes, phone calls, and many other types of media to move and manipulate information. We call these processes "air gap" interfaces. By that, we mean that they are processes which have the potential of being automated using digital means, but currently are being accomplished through manual intervention. The "air gap" interfaces are labor-intensive, slow, costly, and inefficient.

The logistics community has been aware of this problem for some time and has done many things to reduce manual processes. The supply community was one of the earliest users of automated data processing systems. Their implementation of the Standard Base Supply System in the middle 60s was an early example of using digital processing to reduce "air gap" interfaces and labor intensive processes.

In recent years, the quantum advances in microprocessors and miniprocessors have inspired more and more activity within the logistics functional areas for using state-of-the-art technology to replace manual processes. This fact, coupled with a dramatic decrease in the unit cost of such processors, is resulting in a proliferation of initiatives to automate various elements of the information flow throughout the Air Force. What we have as a result is a haphazard incorporation of digital technology into our environment without a master plan for integrating those initiatives. There is also a large amount of duplication because there is little sharing of information, and most initiatives are being worked in somewhat of a vacuum.

Out of this situation came a growing need to set up a program that could serve as the vehicle to tie everything together. LIMSS is then a program to network various forms of logistics information processing by providing an integration architecture and infrastructure whereby existing and planned logistics projects can be joined. At the same time, manual processes that have not been addressed will be reviewed for possible applications of technology.

Design Goals

Clearly, the logistics and engineering information systems of the future must be far more responsive and efficient than today's systems. These new systems must significantly reduce redundant information collection and storage practices. They must use low-cost, microcomputer and minicomputer power to provide the responsive, decision-support tools needed by commanders, supervisors, and technicians at all levels.

In addition, new programs to expand the use of electronic technology in logistics must be based on strong survivability and deployability characteristics so that users can have confidence of being supported in both peace and war.

To accomplish the above goals, significant changes must occur in approaching the automation of logistics information. Our Log-C3 systems architecture must be based on modern networking and distribution processing techniques. Future systems development efforts must permit a large number of pilot projects in actual military units in a variety of MAJCOMs. Different types and mixes of equipment are needed to effectively evaluate different functional requirements.

In addition, if LIMSS implementation goals are to be achieved by the end of this decade, revised property acquisition and equipment management methods must be implemented to allow decentralized acquisition after pilot project results have been verified. This would include use of such things as bases of issue in a table of allowance to expedite acquisition of validated equipment. These new acquisition and property control systems should use the same technologies they will be managing to achieve the highest levels of responsiveness at the lowest overall total cost.

LIMSS Program

To provide the direction and overall program management required for such a broad initiative, AF/LE is implementing the LIMSS program. The program will use a systems development approach. By that, we mean that the LIMSS system will be developed evolutionarily rather than revolutionarily. We do not plan to stop initiatives nor put a damper on current developments. Rather the program will establish a central agency to consolidate lessons learned throughout the Air Force, other services, and civilian industry. This agency will also be responsible for baselining what exists today or is in the planning stages as it relates to LIMSS. The base of information developed will be made available for the use of future planners. At the same time, there will be a pool of technical experts available for assistance and planning. The goal is to encourage individuals in the logistics community to

make use of this center of expertise and information when they plan and develop new systems. Contact with this agency will also result in an orientation on how what they are doing will fit into the integrated system of the future.

The central agency will be the LIMSS Systems Program Office (SPO). The SPO will initially complete the baselining and lessons learned effort. A series of projects will be submitted by the major commands for development of the LIMSS system. The early projects will involve supplanting the "air gap" interfaces at base level and between the bases and higher headquarters. This will involve integrating existing systems and new initiatives into larger systems through networking architectures. The systems development approach means that small subelements of the information flow will be identified, researched, automated, and evaluated in phases. This process will continue until a total integrated logistics system is developed. The SPO will also work closely with other Air Force functional project management offices to ensure compatibility with other appropriate systems within the DOD community.

During the development process, many major issues will be addressed. They will include such matters as the systems architecture necessary to blend things together. The architecture will deal with communications networks, software and hardware requirements, information flow tracking and modification, and distributed data processing.

Other major issues will include modifying logistics policies and procedures. We will have to change the way we do business to take best advantage of this technology. Therefore, as we do the systems development, we will experiment within the pilot projects on modifying the way our logistics business is done.

Multi-level security of the system will be another key issue to be developed. We will not only have to consider segregated data bases within a computer that will be storing both classified and unclassified information, but we will also have to consider controlling what information is available to whom. We must remain cognizant of possible attempts by the enemy to infiltrate our data bases. When we consider information as a resource, we rapidly learn that it or the lack of it is indeed a powerful weapon. It is necessary then to decide what base-level information will be available to MAJCOMs and the Air Staff. Information is now controlled through policies and procedures on what is or is not forwarded to higher headquarters. With the distributed data bases of the future, computers will have to control what information other people can obtain from your data base.

Training on the use of the technology and then concurrently setting the parameters for using the technology in computer-aided instruction will be developed during the pilot projects. Human factors involved when changing the environment and interacting with electronic devices will be another area of concern.

A LIMSS Program Management Directive (PMD) sets up the program and provides the mechanism to integrate on-going and planned related logistics projects into a total logistics information framework. The program will provide a standard architecture and a logistics command, control, and communications infrastructure that will network various forms of information processing.

The first LIMSS pilot project is the EDS Log-C3 Program, a major element of the European Distribution System. The following project description is included as an illustration of how on-going activities in other programs can be effectively integrated with the LIMSS Program—to the great benefit of both efforts. Other early-starting pilot projects are expected in SAC, AFLC, MAC, and ATC.

EDS Log-C3

The European Distribution System (EDS) is a new AF program designed to give greater combat readiness and sustainability to U.S. Air Forces in Europe. Current operational plans in Europe assume that responsive distribution/redistribution of spare parts and aircraft engines is available at all times. However, the current real capability in Europe could not meet this requirement in wartime.

According to a recent Project RAND Study, up to 304 aircraft (involving from 600 to 800 sorties) would be grounded each day in a European war—waiting for available spares and engines to be moved to needed locations. In addition, unpredictable stock losses and consumption factors due to weather, enemy attacks, and sortie variances could compound the problems of providing sustained, responsive support throughout the theater.

EDS expects to use an overnight delivery system patterned after commercial air freight carriers to distribute critical spare parts within 12 to 36 hours to any operating location in Europe—peace and war. The three major subelements under the EDS Program are:

(1) EDS Logistics Command, Control, and Communications (Log-C3) Development
(2) Forward Stockage Development
(3) Assured Air Movement Development

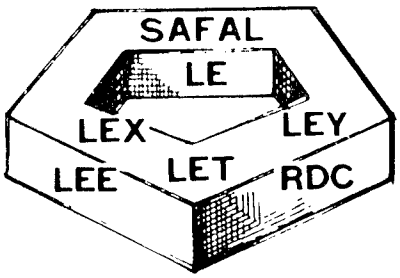
The EDS Log-C3 element will be developed using the LIMSS Program policies and system standards; and, as the first "pilot project" under the LIMSS "Umbrella PMD," EDS Log-C3 will help to establish the pattern for future logistics information systems development. At this time, the EDS Log-C3 system is expected to use a variety of microcomputer and digital communications systems to establish a basic initial operating capability in Europe in FY83.

Initial Log-C3 capability will combine communicating word processing systems with both military and civilian packet-switched communication networks and some digital radio transmissions to network European Base Supply units, Air Freight units, Maintenance Job Control units, the USAFE Logistics Readiness Center, and the MAC Airlift Control Center to provide the interactive Log-C3 system required to identify, make, and implement distribution decisions. Follow-on development of a more sophisticated Log-C3 system and emergency wartime backup capabilities/procedures for use in periods of degraded communication and automatic data processing will be developed by the LIMSS SPO.

Conclusion

The LIMSS Program represents a major step forward in the development of a long-range process for advanced information networks in the logistics and engineering communities. Existing information processing initiatives will be recognized and principle efforts will be devoted towards design and implementation of a very broad system architecture.

This move toward using "systems development" concepts rather than "hardware-oriented" concepts of the past is expected to be a major change in AF logistics doctrine. LIMSS is likely to change the basic way we do business in logistics and engineering functional areas. And, since logistics represents over 40% of the Air Force's annual Total Obligation Authority, the results of LIMSS will affect practically every major element of the USAF.



USAF LOGISTICS POLICY INSIGHT

Equipment Financing Changed

The Deputy Secretary of Defense approved a policy change that directs the financing of equipment for industrial activities with Industrial Fund (IF) resources beginning in FY 1983. This change involves the capitalization of all equipment items on hand in the IF on 1 October 1982 at the undepreciated value. New equipment, other than unique weapon system items, will be purchased and capitalized by the IF. Equipment depreciation will be charged to the IF as a cost of operation, and the costs will be recovered through rates charged to the IF customers. The Airlift Service Industrial Fund is excluded from this equipment capitalization program.

Prepositioned JEIM Studied

The Directorate of Maintenance and Supply, Headquarters USAF, is conducting a study into the feasibility of prepositioning selected Jet Engine Intermediate Maintenance (JEIM) in Europe and the Pacific. Prepositioned JEIM would provide the capability to repair engines much earlier in a wartime situation than if the JEIM were deployed with the other intermediate maintenance shops. Possible benefits could be reduced airlift requirements, reduced budget requirements, and a greatly enhanced engine repair capability. If the results of the prepositioning study show that significant benefits are achievable, a policy statement will be issued.

Technical Order System Reorganized

The Director of Maintenance and Supply, AF/LEY, has directed that the Air Force Technical Order System increase efforts to automate the entire process of TO acquisition, distribution, improvement, and maintenance activities. This will include delivery of magnetic media (such as tapes and disks) from the contractor, digitized data bases at air logistics centers, and limited telecommunications networks. Data terminals may someday function to fill the maintenance manual role. The challenge is "tying it all together."

Rivet Ready Directive Published

The Directorate of Maintenance and Supply has published Program Management Directive (PMD) L-Y 2122 for Project Rivet Ready. There are 25 initiatives designed to refine and improve Air Force equipment maintenance policy and procedures. A new Maintenance Policy Directive is being written and is in the final stages of coordination. This directive will implement many of the initiatives from the PMD. The major feature of the new directive is that it will contain policy guidance only and that MAJCOMs will supplement it with specific procedural guidance tailored to that command's particular mission and equipment. The Maintenance Policy Division, AF/LEYM, is the OPR for Project Rivet Ready.

Space Logistics Supported

Today's trend toward reusable space systems and the increasing importance of space systems to the Air Force mission and national defense dictate an aggressive AF space logistics support concept. With the activation of Space Command in September, both Air Force Logistics Command (AFLC) and Air Force Space Command will become active participants early in the acquisition cycle. Their involvement will support Air Force Systems Command (AFSC) during the development cycle to provide robust, supportable space systems with the lowest life cycle cost through use of space command organic personnel and the existing AFLC depot support infrastructure.

(continued on page 15)

Precious Metals: Losses We Cannot Afford

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Abstract

An analysis of the commercial contracting aspect of the Department of Defense Precious Metals Recovery Program demonstrates how the Department of Defense (DOD) is losing several millions of dollars annually by processing precious-metals-bearing scrap through commercial contractors prior to determining its precious-metals content and value. From research of actual records of various U.S. government agencies and commercial firms, this article shows how these losses are occurring and why the current procedures are unable to prevent them. Current policies requiring cost comparison studies and the reluctance of higher authorities to allow government employees to accomplish work previously contracted out are seen as the major barriers to DOD in preventing these losses in the future. An appropriate solution and an alternative variation to the solution are recommended.

Introduction

Since 1978, the Department of Defense (DOD) has taken significant steps to identify supplies and equipment which contain precious metals and to improve its capability to recover these metals. In FY 1980, the DOD recovered $47 million worth of precious metals at a cost of only $3 million.[1] Many millions more could be recovered; however, the DOD loses several million dollars' worth of precious metals annually as the result of processing the scrap material through commercial contractors before determining its precious-metals content. The U.S. government, therefore, has no idea how much precious metal the commercial contractor should return to it upon completion of the contract. Until the DOD develops the in-house capability to determine the precious-metals content of the material prior to turning it over to commercial contractors for processing and refining, it will never be sure it is getting back all of the precious metal and will always be leaving the door wide open to losses from theft, poor processing practices, and mismanagement.

Extensive use of commercial contractors for precious-metals recovery is a recent development. Prior to 1979, most precious-metals-recovery processing was accomplished in government facilities, including the United States Assay Office (USAO) in New York City. The prices of precious metals made the total recovery value quite small, and the program received very little emphasis. In 1977, the General Accounting Officer (GAO) audited the DOD Precious Metals Recovery Program (PMRP) and directed Congress' attention to possible heavy losses. Shortly after this, the prices of precious metals increased by eight to ten times their 1977 value. These events pressured the DOD to place urgent emphasis on the PMRP, and it chose commercial contracting in lieu of expanding the in-house capability. Commercial contracts for processing precious metals increased from 5 in 1977 to over 40 in 1981, and the number of commercial contractors bidding for these contracts increased from 4 or 5 to over 20. The additional emphasis placed on the PMRP has increased the number of precious-metals-bearing items identified within the DOD stockpile of materials. Although many more items are being identified as containing precious metals, the type and quantity of precious metals and the best method of recovery still remain unknown.

A paper informally known as the "Bowers Study," initiated by Major General Emmett W. Bowers, Deputy Director of the Defense Logistics Agency, on 31 August 1981, was the first attempt to analyze this problem in depth and is still in progress.[26] Since there are no writings on this topic, only one study which has just started, and very little documentation, most of my information has been drawn from the actual records in the DOD Precious Metals Recovery Office (PMRO), Colts Neck, New Jersey, and interviews with the acknowledged experts on the subject. I was the first commander of the PMRO and was deeply involved in the evolution of the organization and the contracting program.

Background

To comprehend the importance of the commercial contracting problem and the lack of knowledge about precious-metals recovery, the reader needs to understand the evolution of precious-metals recovery within the federal government.

Why Recover Precious Metals

Precious metals, as identified by the U.S. government, are gold, silver, and the platinum-family metals.[28] Although some are of U.S. origin, we must import the greater share to satisfy our ever-increasing requirements.* Precious metals are used extensively in computers, electronics components of weapon systems, radar tracking systems, torpedo batteries, film, space satellites, etc. Although they are used in the manufacture of these items, the metals are not consumed and, therefore, can be recovered and reused indefinitely.

When the federal government recovers and refines precious metals, they are placed in stock and reissued upon request by the Defense Industrial Supply Center (DISC) to the various federal agencies, for use as government-furnished material in the manufacture of new supplies and equipment. This method reduces the cost of the new equipment and consequently reduces government spending.

Evolution of the Precious Metals Recovery Program

The DOD began recovering silver from electronic and engine scrap in 1954.[29] Between 1954 and 1974, silver was being recovered primarily from torpedo batteries, photographic and x-ray film, and film processing solutions. Eighty to ninety percent of the silver recovered came from torpedo batteries.[23] Responsibility for recovering this silver rested with the Department of the Navy, which partially processed the material in-house at the Naval Weapons Station (NWS), Earle, New Jersey. The refining was completed at the USAO in New York City or by commercial contractors after the material was blended and assayed for silver content. Gold was being recovered from eyeglass frames, buttons, insignia, dental scrap, selected electronic systems, and computer parts by the U.S. Army at Pueblo, Colorado. All processing including refining was accomplished by U.S. Army personnel. The General Services Administration (GSA) was responsible for recovering the platinum-family metals.

*According to the GAO, the U.S. uses about 160 million troy ounces of silver annually, but mines only about 40 million. By 1985, the U.S. expects the demand to be about 230 million, with mining accounting for only 50 million troy ounces.[30]

In 1974, the GSA assumed overall responsibility for precious-metals recovery by all federal agencies.[21] Each civilian agency was responsible for recovering precious metals from the material it generated. This was primarily silver from film and film-processing solutions. The DOD consolidated its responsibility under the newly formed Defense Supply Agency (DSA), later redesignated the Defense Logistics Agency (DLA). The DLA maintained the existing Army and Navy facilities, personnel, and procedures until 1978. In 1977, the GAO audited the DOD PMRP and reported to Congress that several millions of dollars were being lost annually.[29] The DOD in fact was losing more precious metals than it was recovering. As a result of this audit, the DOD consolidated its whole program under a new organization called the DOD Precious Metals Recovery Office (PMRO), which it located at the Naval Weapons Station, Earle, New Jersey. The gold-recovery operation at Pueblo, Colorado, was closed; and all precious-metals-recovery operations, plans, policies, procedures, etc., became the responsibility of the new PMRO.

The Advent of Commercial Contracting

Since 1978, the DOD has attempted to cut processing costs and personnel requirements by reducing the use of government personnel and facilities in favor of contracting out with commercial sources. When the gold-recovery operation in Pueblo, Colorado, was closed, all gold recovery was contracted out or accomplished at the USAO. In addition to the change in gold recovery, the increased amount of material being identified for precious-metals recovery, the increase in precious-metals prices, and the required government in-house versus commercial contracting comparisons resulted in a great increase of material being processed by commercial contractors. Since September 1978, precious metals area representatives (PMARs) have been traveling throughout the U.S. as salesmen for this program. They inform and train DOD personnel in proper identification and handling of precious-metals-bearing material and assist in the recovery process. Now all precious-metals-bearing electronic scrap is accumulated for precious-metals recovery, which adds approximately two-million pounds annually to the *half-million* pounds previously being processed commercially.

Commercial contracting has greatly increased owing to annual cost comparisons of commercial contracts versus government processing. Costs of the contracts were compared to costs of government personnel, equipment, and operations to determine the most economical method of processing. However, the costs required to properly administer these contracts were unknown at the time of comparison and, therefore, were not considered as part of the cost of contracting. The amount of precious metals being recovered through these commercial contracts has been consistently lower than expected, thus revealing that the actual amount of precious metals recovered must also be included in a proper cost comparison study.[24] Several government processes have been discontinued; i.e., refining gold, processing cartridges which are used to recover silver from photographic and x-ray film developing solutions, and ball milling and blending film ash. In every case, the amount of precious metals recovered commercially has been less than previously recovered by government operations.[23]

Another cause of additional contracts is the scaling down of the USAO in New York City; this office once processed most of the material generated in the DOD program, but has now discontinued all processing operations.[23]

The Unknown Content

The DOD currently has no protection against loss of precious metals during processing by commercial contractors. Although great strides have been made, and are continuing to be made, in capturing the items and enriched scrap, very little is known about how much precious metal is in fact contained within them.

Why the Unknown

The precious-metals content is unknown for a variety of reasons. First, many of the electronic components in weapon systems, computers, and communications equipment are built according to performance specifications. The government requires the manufacturer's item to meet certain performance standards but does not specify how it is to be manufactured. Therefore, the manufacturer determines the need for precious metals in the item. The manufacturer has no requirement to inform the government whether or not precious metals were used or in what quantity they were used. For example, a radar-tracking system located in the Marshall Islands was recently dismantled, and 10,000 microwave antennas were turned in to the PMRO for gold recovery. Estimates ranged from 10,000 to 3,000 troy ounces of gold. This was a variance of over $4,000,000 worth of gold. When the material was processed commercially, only 1,000 troy ounces were returned to the government ($600,000 worth versus an original estimate of $5,400,000).[8]

A second reason is the substitution of nonprecious metals for precious metals in the manufacturing process. If the world market price of a precious metal increases enough, a previously uneconomical substitute for the precious metal will suddenly become more economical; and the manufacturer will logically begin the substitution.

A third reason for unknown precious-metals content is that manufacturing processes are not consistent in their precious-metals washes, solders, and plating. Therefore, two identical items containing gold wash, for example, will not contain the same amount. Change in the "state of the art" of some manufacturing processes is another reason for variance in precious-metals content. The film industry is an excellent example of this. All x-ray and photographic film is coated with silver. Over the past few years, Dupont and Kodak have fluctuated by as much as 30% in the amount of silver used in coating various sizes and types of their film. When film is processed for precious-metals recovery, there is no way to determine the vintage of the film or the amount of silver washed off the film as it was developed. Army uniform buttons, for example, now contain 50% less gold than the previous contract required. Both sets of buttons look exactly alike and have the same NSN, but have a significant difference in gold content.

The last reason is possibly the most important. The collection of millions of pounds of precious-metals-bearing scrap and items of various shapes and sizes, containing a variety of precious metals, from hundreds of locations throughout the world, results in an amazing conglomeration of scrap.

Electronic scrap contains the greatest variety of precious-metals-bearing material and the greatest variety of types of precious metals. Table 1 shows examples of this variety. The DOD accumulates between 1.5 and 2.0 million pounds of this scrap per year, and it contains between .13 and 14.0 troy ounces of gold plus other precious metals per ton.[23] The richest material, often culled and processed separately, contains up to 77.0 troy ounces per ton.

TABLE 1

DPDO	Net Wt. Shipped	Troy Ounces Per Ton Gold	Silver	Platinum	Palladium
Hill	389,930	2.267	20.665	.06	.00
Lewis	36,325	6.387	61.774	.00	.00
W-R GA	31,240	1.560	78.333	.00	.00
Kelly	102,200	.130	3.941	.00	.00
Eglin	15,020	.720	13.173	.00	.00
Crane	5,258	14.010	120.840	.00	.51

Attempts to Eliminate the Unknown

Several actions have been taken by the DLA and its PMRO to eliminate, or at least reduce to an acceptable level, this unknown content deficiency; but these efforts fall considerably short of enabling the PMRO to predict accurately the precious-metals return from commercial processing contracts. The DLA is cataloguing, in a precious metals master file (PMMF), all items known to contain precious metals and has increased its list from 4,000 items to over 140,000.[14] Each of the military services is changing its procurement policies to require manufacturers to report actual precious-metals content information under all new acquisition contracts.

Many items are being assayed for the PMRO by the USAO and by commercial assayers to help identify precious-metals content of specific items. The Bureau of Mines (BUMINES) has recently developed a process for segregating scrap materials into various homogeneous lots by their base material. These lots can then be accurately assayed for precious-metals content prior to processing. Increased segregating and sorting of material at the DLA Property Disposal Offices (DPDOs) around the world is helping to eliminate much of the nonprecious metals from electronic scrap, which reduces the magnitude of the problem but is not the final answer.

Current Recovery Methods

Precious metals are being lost during processing, but since we are not determining the precious-metals content prior to giving material to commercial contractors, we have no way of knowing how much. To fully appreciate how easily precious metals can be lost during processing, one must have some knowledge of how the processing is accomplished.

Film

Photographic and x-ray film is collected at using DOD facilities and shipped directly to the contractor on an "as-required" basis, or turned in to their local DPDO, which in turn ships it to the contractor. The contractor gathers the film into economic processing lots. It is then incinerated, and the resulting ash is melted in crucibles. Impurities are skimmed from the top of the molten metal and set aside to cool. These impurities are called *slag*. Samples of it are assayed later to determine if it contains enough silver to justify reprocessing. The molten metal remaining in the crucible is then poured into molds to cool. As it is poured, samples are taken according to specifications in the contract. These samples are assayed by the contractor and the U.S. government and compared to determine the exact amount of silver contained in each pound of homogeneous metal, which has been removed from the molds and is in bar form. Each bar will contain a variety of metals, including a now known percentage of silver. The total weight of all the bars is multiplied by this percentage of silver to determine the total number of troy ounces of pure silver in them. This amount of .999 pure silver is then shipped to the USAO by the contractor to be placed in the government account. The PMRO then provides instructions to the contractor for disposition of the slag and the nonprecious metals in the bars.

Torpedo Batteries

Silver-celled torpedo batteries are shipped from using activities to the PMRO where they are disassembled. The silver-bearing plates are incinerated to remove plastics and rubber and placed in barrels for shipment to contractors for processing. The contractors place them into an acid bath to remove most of the nonsilver material and then transfer them to crucibles for melting. The remaining process is the same as for film ash.

Electronic Scrap

All electronic scrap is turned in to DPDOs by the using activities. This material is segregated and sorted by DPDO personnel into two lots according to the degree of sorting feasible at each DPDO.* It is then shipped to the PMRO for classifying and for accumulating into economic lot size prior to shipping to a commercial contractor for processing. The contractor must hand sort the remaining aluminum from the piles and process the good material through a series of acid baths, incineration, and smelting phases, depending on the kind of base metals, to retrieve and refine all types of precious metals that are contained in the scrap. The final phase is the smelting and sampling process described above.

The Losses

Precious metals can be lost through incorrect processing, negligence, pilferage, and outright fraud. Since the government material is shipped to the commercial contractor without precise knowledge of its precious-metals content, protection against these losses, or even detection of the losses, is virtually impossible. The government's quality assurance representatives (QARs) are unable to properly monitor the contractor's handling of the government material.

How Losses Occur

Incorrect Processing Methods. Start-up costs for processing precious metals are relatively small. All one needs are a few hand tools for segregating and sorting material, an incinerator, a crucible, and some molds. Because of these low capital requirements and the resurgence of interest in precious metals, several new small businesses are now successfully competing for processing contracts and are not always using the best equipment and methods to prevent losses. Approximately 20% of the silver from film is normally lost during incineration. If the film is burned too quickly, more

*The values of this material are much higher than those shown in Table 1. This degree of segregating and sorting was only recently established on a trial basis.

silver rises up the smokestack; and if the stack is not properly filtered, this silver is lost. Processing for one precious metal will disintegrate other precious metals if proper procedures are not followed. Failure to segregate and sort out troublesome metals like aluminum will cause the precious metals to be trapped in the other metal and discarded as slag or lost as gasses. Through improper skimming and sampling techniques, precious metals are lost to slag or simply overlooked because the sample was not truly representative. Precious metals are also lost through mishandling and damaging containers, which cause them to leak, and through incorrectly recording weights owing to improperly calibrated scales.

Negligence. Losses occur through incorrect processing methods because the contractor lacks proper equipment or knowledge. Losses through negligence occur by misplacing material, using improper procedures because of inadequate supervision, or by skipping necessary steps in meeting deadlines that are too tight.

Pilferage. Pilferage of precious-metals-bearing material by the contractor's employees or outsiders sometimes occurs because of inadequate security precautions. Historically, most contractors processing precious metals have kept security minimal in the belief that elaborate security measures merely attract attention to the facility and the valuable material being processed.

Fraud. Possibly the greatest loss of government precious metals in the past few years can be attributed to fraud, but without prior knowledge of the precious-metals content of the government's material and inadequacies of government-contract surveillance, it is virtually impossible to prove. A contractor can purposely lose precious metals during processing and recover them later in several ways. He can use soft linings in his crucibles which will absorb some of the molten metals. After several weeks or months, and after processing material from the government and several civilian companies, he can remove the lining, pulverize it, and recover the precious metals from it. In hand segregating the aluminum and other contaminants from the precious-metals-bearing material, the contractor can purposefully include some precious metals in the pile with the contaminants and retrieve them at a later date prior to disposing of the contaminants. He can also substitute similar-looking nonprecious-metals-bearing material of equal weight for a portion of the precious-metals-bearing material before starting his processing. He can incinerate too quickly and use two sets of filter bags in the incinerator stack, one for himself and one for the government. He can purposely trap precious metals in aluminum or skim too deeply, thereby mixing precious metals into the slag. He then can ensure samples of the slag are taken so as to avoid the resulting rich portions. A few allegations of fraud are currently under investigation, but proof is difficult to show.

Why We Know Losses Occur

Costs. As inflation has sent prices skyrocketing over the past few years, the bids on processing the U.S. government's precious-metals-bearing material have dropped to well below the contractor's actual costs to process the material. In one instance, the low bidder even said he would pay the government to process its material: In 1978 the cost to process silver-recovery cartridges was $14.85 per cartridge; it was $1.17 in 1980; and, in 1981, one bidder offered to pay the government $.11 per cartridge for the privilege to process them—he said he could sell the used recovery cartridges after removing the silver sludge.[22] No revolutionary technological discovery has occurred to justify this trend. Another contractor said he could use the contaminated silver in refining the gold he mines from the hills in California. Silver and gold are compatible materials for the refining process.

Another example of reduced costs involves high-grade electronic scrap. In 1979, the government paid $.11 per pound for processing, $.026 per pound in 1980, and $.00027 per pound in 1981. This latest figure is insufficient even to cover the contractor's cost of preparing the paperwork required by the government, not to mention the cost of shipping from Colts Neck, New Jersey, to the contractor's plant. The contractor said he could do this because he is the only bidder with seats on the New York Commex, New York Mercantile and Treasury Bills Exchanges and can make his profit by hedging.[18] This explanation does not clarify exactly how he makes his profit or how his competitors can keep dropping their bid prices as well.

Return Rates. The rate of return of precious metals to the government from commercial contractors is significantly less per pound of raw material than previously produced through government processing. Battery plates are a good example of this disparity in return rate. Because of an insurmountable backlog in the USAO in 1980, 67,775 pounds of B-1 battery plates were shipped to a commercial contractor for processing and 444,808.15 troy ounces of silver were returned to the government.[7] On the basis of historical data, the government expected a return of 557,199.08 troy ounces.[35] The amount actually returned was 112,390 troy ounces less than expected. Processing at the USAO from December 1977 through April 1980 resulted in returns ranging from 51 to 75% with an average of 57%.[35] The extremes were due to small lot sizes. When large volumes like the one in the contract mentioned above are processed, they closely approximate the 57% figure; therefore, this contract should have produced an amount very close to the government's estimate. An investigation was initiated to determine the cause of this unexplained loss of approximately $1,600,000 worth of silver.[37] No acceptable explanation was ever found.[31]

Similar results can be seen from film-ash records. From August 1976 to August 1978, film was incinerated by commercial contractors and returned to the PMRO, which pulverized it with a ball mill and blended it until it was a thoroughly homogeneous powder. Samples of this powder were assayed, and invitations to bid on the processing of this ash indicated the exact silver content. Returns for this two-year period averaged 7,474.718 troy ounces per ton of ash.[23] Approximately 118.5 tons of ash were processed. Owing to the requirement to compare government operations costs with commercial sources, this practice ceased in October 1978. As shown in the table below, the average yield per ton dropped drastically when ash was turned over to a contractor without first pulverizing, blending, and assaying it to determine the exact silver content.[5,6]

TABLE 2

Contractor	Weight in Tons	Average Yield Per Ton
Assayed Ash	118.5	7,474.718 t.o.
A	94.76	1,865.13 t.o.
B	40.41	1,405.93 t.o.

If the silver percentage were the same, at a price of $10 per ounce of silver, this would amount to a loss of $5,312,445 on Contract A and $2,452,397 on Contract B. Other material would most likely reveal the same trends; however, detailed records of returns in prior years are not available.

Contract Administration. Although one might logically argue that the answer to this problem is close surveillance of contractor operations by government representatives, this has proven to be impossible. The Defense Contract Administration Service (DCAS) has the responsibility for administering these contracts; however, it is unable to properly support the PMRP requirements. As a minimum, to ensure proper surveillance of the processing of government material, the Contract Administrator or the Quality Assurance Representative (QAR) must:

(1) Witness the receipt and weighing of all government material and ensure that proper weights are recorded.

(2) Ensure that government material is properly accounted for and protected throughout the processing cycle.

(3) Witness all processing steps to ensure that all government material is processed and properly sampled.

(4) Ensure that all terms and conditions of the contract are complied with, including all time constraints.

(5) Advise the PMRO of any difficulties arising and take appropriate corrective action.

(6) Ensure that all federal, state, and local environmental laws and regulations are met.

(7) Ensure proper security and handling of melted bars, slags, and residual materials.[3]

None of these functions is being properly performed. To accomplish them, QARs must be knowledgeable of precious-metals-recovery processing procedures and be available at the contractor's facility during all operating hours. Very few QARs are technically qualified to detect inappropriate procedures; however, some contractors operate 24 hours each day, a situation requiring three full-time QARs for adequate surveillance.[27] The DCAS QAR manpower requirements are based on dollar amounts of the contracts they administer. Any contract under $10,000 is considered a small purchase and receives minimal administration. The computer advises the contract administrator when the contract completion date has passed so he can contact the contractor and determine the cause and the action required.

Precious-metals-recovery contracts may be the only government contracts in existence whereby the primary potential loss to the government is the value of the government furnished material rather than the cost of the contract. Because of this uniqueness and the lack of contract specificity, the normal DCAS operational and manning policies were not appropriate to support the PMRP. Contracts are now better written and support is more often forthcoming.

Industry Policies. Although the drastic reductions in contract prices and precious-metals-return rates offer clear evidence of significant losses, the precious-metals industry policies offer still another reason for doubting the appropriateness of the current DOD commercial contracting policy. My discussions with several companies revealed that they unanimously process their own precious-metals-bearing material through the complete refinement process whenever possible. When it is not economically feasible to do so, they process the material to the point that they can properly sample and assay to determine the exact content prior to turning the material over to even the most reputable refiner for the final stages of refinement. Even after assaying their material, their own personnel accompany the material to the refiner's facility to witness every step of the refining operation. However, representatives of several companies in the precious-metals-recovery business have stated that even the closest surveillance of the refining operation will not prevent a refiner from stealing precious metals if he is so inclined.

Improvement Efforts. Several actions have been taken to reduce the potential for losses from commercial processing, but the problem remains. The improvements only help to highlight the problem. The "terms and conditions" and the detailed specifications of the contract have been significantly improved to assist the contract administrator and QAR in their surveillance of the contract performance; however, these have merely added to the list of functions which the QAR has insufficient time to perform. Additional segregating and sorting of material by government personnel has eliminated much of the contaminants which create processing problems. This effort helps reduce the processing steps and the time required to complete the processing. Comparison tests and data are being gathered to help identify losses and provide data as to where and how the losses are occurring. More emphasis is being placed on identification and sorting of precious-metals-bearing material, but no one organization attempts to process as much volume and variety of material as the DOD.

An Appropriate Solution

A workable solution to this problem does exist and is well within the capability of the DOD to implement. The DOD must either find the precious-metals content of all material prior to transferring it to commercial contractors for processing or instead complete the refining process with government facilities and personnel. The following steps are required:

Step 1 - Segregate and Sort. Segregating and sorting material as close to its source as feasibly possible will eliminate most of the weight and contaminants and reduce the disparity in return rates by making the material more homogeneous. Materials such as film, dental amalgam, hypo flake, cartridges, uniform buttons, eyeglass frames, and many others are currently sorted at the user level or at DPDOs and processed in distinguishable lots. This policy should continue. The PMRO should continue disassembling torpedo batteries, other silver-bearing batteries, and similar material at the PMRO facility. Computers and other electronic equipment and scrap should be hand segregated and sorted either at the using activity or servicing DPDO depending on available security and expertise. This sorting is to eliminate the aluminum, stainless steel, and other nonprecious-metals material.

These segregating and sorting operations will not only remove much of the contaminants and excess shipping weight, they will reduce the size of the individual pieces to acceptable limits for the next two steps. There should be little or no extra cost involved in this step since it is currently being performed.

Step 2 - Incinerate. Materials such as battery plates, battery cells, film, and those containing plastics, rubber, and other nonprecious-metals material which can be eliminated through incineration without losing the precious metal should be incinerated. Some of this material is currently incinerated on military installations or at the PMRO facility. The classified film should be incinerated at secure burn facilities on government installations or at the new burn facility in the Washington, D.C. area.* The remaining unclassified film should be shipped to a central incineration facility. An existing facility with large incineration capacity, like the Rocky Mountain Arsenal, could be used, or large incinerators could be installed at the PMRO or the USAO. If incinerated other than at the PMRO, the ash must be shipped from the incinerating site to the PMRO.[16]

*An incineration facility is being constructed at NSA Fort Meade, Maryland, to burn classified film for the intelligence community in the Washington, D.C., area. This facility should be operational in 1982.

Step 3 - Crush and Sort. Materials which have been processed at the USAO in the past such as battery plates, cartridges, hypo flake, and Class A silver and gold should be shipped to the USAO. Other segregated and sorted electronic scrap, buttons, eyeglass frames, engine parts, etc., and incinerated material other than film should be cut to appropriate size, if necessary, and placed in a crusher. After the material is crushed, it should be processed through the sorting operation specifically developed for the PMRP by the BUMINES.[2] This unit sorts the scrap material into homogeneous lots by type of base metal; for example, copper, iron, or tin containing precious metals. This material can be assayed to determine the precious-metals content per pound. The prototype has been dismantled for other research projects; however, the equipment consists of off-the-shelf items available on the local market for approximately $975,100. Annual operating costs would be approximately $342,100. On the basis of historical data previously discussed, expected returns from this process would be about $1,500,000 annually in gold plus other precious and nonprecious metals.*[2] This processor could easily be located at the vacated DPDO facility adjacent to the PMRO.

Step 4 - Pulverize and Blend. If material currently processed at the USAO is to be refined in the future by commercial contractors, all film ash and other similar material should be pulverized in the ball mill located at the PMRO. The pulverized material should then be placed into the blender located at the PMRO and blended into a homogeneous substance suitable for assaying. The precious metals content per pound of pulverized and blended material would then be known.[32]

Step 5 - Obtain Commercial Contract. Completing the first four steps will result in all of the precious-metals-bearing material being in homogeneous lots, identifiable by type of material, and properly assayed to determine the exact precious-metals content. At this point, the material is in a configuration which is easy for a commercial contractor to refine, and the exact precious-metals content is known, thus eliminating the potential for loss at the contractor's plant. The solicitation for bids will include an explanation of how the sampling was accomplished and the assay results. The bidders may take their own assays of the material to verify the content if they desire. The successful bidder may, at his option, transfer to the U.S. government pure (.999) precious metals in granulated or bar form immediately in exchange for the government material and be credited for satisfying the terms and conditions of the contract. This option will also save government funds, since no contract administration or surveillance will be necessary.

A Variation to the Solution

The U.S. government has the experienced personnel and equipment to accomplish the refining phase and avoid commercial contracts completely. The USAO in New York City currently has an excellent staff of managers, administrators, and technicians who have been in the precious-metals-refining business for up to 38 years. They also have all of the equipment necessary for refining precious metals. They have been refining gold and silver at their current location for about 60 years; however, the Treasury Department is seriously considering closing this facility. Some of these experts and equipment could be transferred to the PMRO to refine precious metals from the material described in my original solution.

The advantages of following this procedure are many. First, the USAO currently accomplishes hundreds of assays annually for the PMRP to determine if precious metals exist in particular items and to agree on the precious metals due the government from commercial contracts. Without a government assay facility, contract settlements will be difficult, expensive, and time-consuming. Second, the USAO has been refining approximately 50% of the PMRP annual silver recovery. If the service is lost, this high-grade material will be subject to the same losses currently experienced with other types of material. Third, the USAO currently stores pure precious metals for the PMRP and issues it to other organizations as directed by the DOD. Fourth, over the past five years, the USAO returned 188,982 troy ounces of silver to the DOD from sweeps (residue from the refining process).[23] This return is approximately $2,000,000, which commercial contractors could not return because their sweeps are the result of processing material from several different organizations. Fifth, material processed at the USAO has consistently returned higher rates of precious metals than that processed by commercial contractors and requires no contract administration.

The USAO has been such a vital part of the DOD PMRP that its loss will be a serious blow to the program. Therefore retaining the expertise, equipment, and the vital functions they perform is essential.

Conclusions

Although the evidence may be largely circumstantial, all indicators clearly point to significant losses of precious metals through commercial contracting. The only satisfactory solution to this problem is to determine the exact precious-metals content of the material prior to turning it over to a contractor. The proposed solution will provide that information and successfully close the door on these losses. Even if the anticipated savings do not materialize, the additional cost will be justified by the additional security and the assurance that the program is being managed in a way which protects the rights of the government and the taxpayers.

Until recently, sufficient data was not available to present a good case against the trend of contracting out, but now the evidence is growing, and the trend must be reversed. Reversing the trend will require that the Precious Metals Recovery Program be exempted from annual cost-comparison studies; the program must be properly funded to absorb the processing and assaying functions of the USAO it so vitally needs; and the expertise must be transferred from the USAO before it is no longer available. The problem is identified; the solution is clear; the time for action is now.

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*Based on a capacity of six tons per day and 1980 prices.

CAREER AND PERSONNEL INFORMATION

Military Career Management

Assignment to Defense Logistics Agency

When most Air Force logistics officers are assigned to the Defense Logistics Agency (DLA), they wonder how a tour outside the Air Force can possibly benefit their career. Actually, an assignment to a joint supply support operation can be a challenging, stimulating experience.

Contrary to popular belief, a military assignment at a DLA Inventory Control Point (ICP) is not a move outside of the main line of DOD supply support to the military services. DLA activities are directly involved in supporting weapon systems critical to DOD's mission. For example, the Defense General Supply Center (DGSC) supports requirements for B52 TF-33 engine thermocouples and Polaris submarine oxygen generator modules. With the advent of the consumables package from the services, DLA's mission support role assumes even more importance. At DLA, a military supply officer has the opportunity to develop an understanding of the wholesale supply system, a knowledge not easily obtainable at the retail level.

Basically, in DLA, one learns how the cogs in the logistics wheel actually operate: from the development of specifications in technical operations—through the computation of the requirements in supply operations—to the procurement process culminating in the award of a contract. But the process does not end there. Later, the military officer quickly finds that contractors do not always comply with the required delivery dates. To prevent production slippages, ICP personnel must constantly remind delinquent contractors of their obligation to keep the pipelines flowing. At this point, it becomes apparent that providing uninterrupted supply support is somewhat difficult.

It is particularly beneficial to understand the requirements determination process, because it emphasizes the importance of perceptive forecasting. Inventory managers determine requirements based on available information. If a service does not identify projected requirements, the user will find himself with an unacceptable lead time when the actual need occurs. Therefore, military officers at DLA ensure that customers provide the wholesalers with adequate forecasts, which in turn enables them to maintain a storehouse of assets ready for issue at any time.

The rotation of military officers through the ICPs produces a continuous flow of fresh talent. The officers provide new concepts and serve as a readily available source for information concerning service requirements.

So, through a tour in DLA, the officer not only obtains a wealth of knowledge about the wholesale environment, but also contributes to the DOD mission by providing timely support to the services.

Contributed by:

Major A. Giles Sconyers, USAF
DGSC, Richmond, Virginia

Civilian Career Management

Logistics Civilian Career Enhancement Program (LCCEP)

Logistics Quality Assurance has become the eighth career family in the LCCEP!

Logistics Career Families
Acquisition Logistics
International Logistics
Logistics Plans
Maintenance
Material Management
Supply/Distribution
Transportation
Quality Assurance (Logistics)

TABLE 1

In a joint memorandum, 14 May 1982, Lloyd K. Mosemann II, Deputy Assistant Secretary of the Air Force (Logistics), and James E. Williams, Deputy Assistant Secretary of the Air Force (Acquisition Management), agreed that selected positions located in the Air Force Logistics Command will be included under LCCEP merit promotion procedures:

(1) Quality Assurance positions located in Material Management, Distribution, and Depot Maintenance functions.

(2) Quality Assurance positions associated with overall AFLC management of Logistics Quality Assurance.

All other Air Force Quality Assurance positions will come under the general purview of the Acquisition Civilian Career Enhancement program.

In July 1981, General Bryce Poe, II, former commander of the Air Force Logistics Command, initiated the inclusion of AFLC Quality Assurance in the LCCEP. His comments emphasized the importance of, and the direct involvement of, AFLC Quality Assurance in the logistics functions, such as Depot Maintenance, Distribution, Materiel Management, and other processes, as opposed to Acquisition type programs. It was expected that these close working relationships with logistics functions might provide cross-feed opportunities for QA personnel in other logistics families by becoming a part of LCCEP. Personnel in the Office of Civilian Personnel Operations are striving to provide the smooth incorporation of Quality Assurance as an integral part of LCCEP.

There are about 275 GS/GM-12 through GS/GM-14 QA positions in AFLC. Of this number we expect about 103 to be identified as Career Executive positions. About one-half will be categorized as Career Essential and the other half Cadre Reserved. As vacancies occur in these positions, management will request fill action through their civilian personnel office from the Office of Civilian Personnel Operations (OCPO), Logistics Career Program Management Branch (MPKCL), Randolph AFB, Texas. The planned start date for staffing these positions under LCCEP procedures is 1 October 1982. A list of Career Executive positions is provided to all Air Force bases periodically. Table 2 shows a breakdown of the positions by locations and grade levels.

AFLC QUALITY ASSURANCE CAREER EXECUTIVE POSITIONS GS/GM-1910

LOCATION	12	13	14	TOTAL
HILL	8	4	3	15
KELLY	7	5	3	15
MCCLELLAN	11	5	3	19
NEWARK	5	2	-	7
ROBINS	9	5	3	17
TINKER	10	5	3	18
WPAFB	5	5	2	12
TOTAL	55	31	17	103

TABLE 2

Inclusion of Logistics Quality Assurance positions in LCCEP offers significant advantages to managers and potential managers in the Quality Assurance community. One advantage is broader visibility and competition for jobs. Qualified people are automatically considered for positions in all areas for which they are registered. If they wish to be considered for local positions only, registration in their own area is all that is required. Another advantage is that positions are filled using standard Air Force Promotion Evaluation Patterns (PEPs). These PEPs reflect requirements of the job and are developed by functional experts. PEPs may cover one position or groups of like LCCEP positions regardless of the physical location of the jobs. Approved LCCEP PEPs for QA positions will be made available to all interested personnel on microfiche at their local central civilian personnel office. These documents are helpful to personnel in learning about the qualifications for various LCCEP positions. Further, PEPs used in conjunction with Career Patterns and Master Development Plans are invaluable for career planning. Table 3 shows a projection of the number of PEPs that will be developed by the QA PEP Workgroup, chaired by Mr. W. Thoni, OC-ALC/MMA, Tinker AFB, OK.

AFLC CAREER EXECUTIVE POSITIONS/PROJECTED NO. OF PEPS

GS/GM			
12	13	14	Total
55/12	31/8	17/4	103/24

TABLE 3

The month of April 1982 was the annual "Open Season" for people to register in the LCCEP inventory. At that time, about 23% of the QA GS/GM-11 and above personnel were registered Air Force wide and 37% AFLC wide. QA personnel have always had the opportunity to register in LCCEP. However, inclusion of QA positions in the program was expected to generate new interest for registration. As a result, a special "Open Season" was held Air Force wide, 7-18 May 1982, to provide QA personnel another opportunity to register in the LCCEP and apply for the Logistics Executive Cadre. The Cadre selection process will be very competitive. Cadre selectees will receive Air Force-wide visibility as "tops" in the business and receive first consideration for Cadre Reserved position promotions and developmental opportunities. Since personnel must be registered in the inventory to be considered for LCCEP positions, and have absolutely nothing to lose by registering, we expect figures to increase sharply.

The inclusion of AFLC Quality Assurance in LCCEP involves the accomplishments of many actions on a time-phased schedule. AFLC Quality Assurance and Logistics Career Program Management jointly planned these actions and are assuring their timely accomplishment.

(Mr. John Coleman, AUTOVON 487-4087/88)

(Logistics Policy Insight continued from page 7)

FUTURE LOOK 1982

The third annual Logistics Long-Range Planning Conference, FUTURE LOOK 1982, convened at Homestead AFB, Florida, during the week of 9 August. Senior officers from logistics, operations, and the research, development and acquisition communities met to focus on logistics planning out to the year 2000. Particular emphasis was placed on translating logistics long-range objectives into near- and mid-term programs to obtain the capabilities articulated in *Air Force 2000*.

Coming in the Winter Issue

- **Assessing and Ensuring Future Weapon Systems Effectiveness**
- **Corrosion: A Formidable Air Force Enemy**
- **Logistics Capability Measurement System**
- **Contracting for Reliability**
- **Logistics Data Management**
- **Dyna-METRIC**

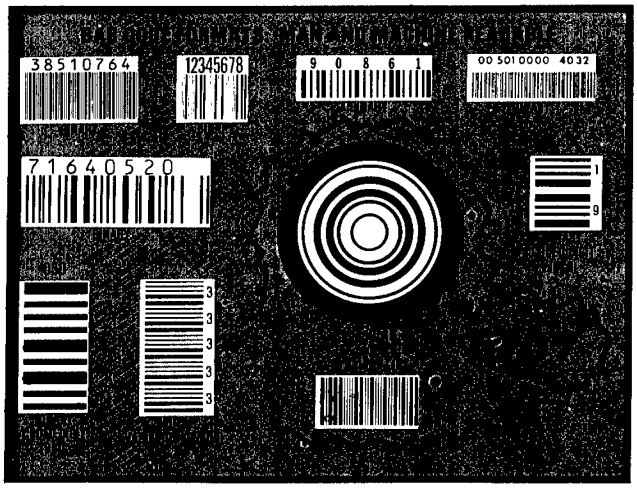
LOGMARS - "An Advanced Technology Comes of Age"

Lieutenant Colonel John E. Gould, USAF
Chief, Advanced Technology Programs
DCS/Logistics and Engineering
HQ USAF, Washington, D.C. 20330

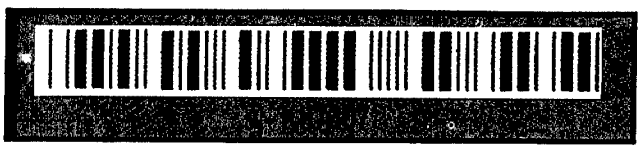
Introduction

A recent Office of the Secretary of Defense (OSD) study report on applying bar code technology to today's logistics systems has shown that the use of machine-readable symbology is an efficient, cost-effective method of data entry which can result in major improvements to logistics management. Based on this conclusion, OSD, on 9 October 1980, approved the adoption of the 3-of-9 bar code as the DOD standard. This long-awaited decision lifted a three-year moratorium on all independent projects involving automated marking and reading. It also paved the way for developing and implementing an Air Force plan to install the new standard. The official program title is DOD Logistics Applications of Automated Marking and Reading Symbols (LOGMARS). The Air Force implementation plan for LOGMARS is designed to increase productivity while improving efficiency and effectiveness where and when use of the technology can be proven cost-effective.

Bar Code Quiz



Can you select the DOD Standard Bar Code adopted on 9 October 80? You were correct if you selected none of the above. Each code has individual merit, but many lack flexibility. DOD adopted the 3-of-9 bar code with Optical Character Recognition Font Style A (OCR-A) printed above or below the bar code, primarily due to its flexibility. An example of the 3-of-9 bar code looks like this:



The quiz clearly demonstrates that bar codes come in a variety of shapes and sizes. As a general rule, bar code symbols use, in sequence, the height and width of marks and the distance between marks to express numbers and letters. Most bar code symbologies are structured in vertical or horizontal linear patterns, while others are circular. The most common symbol code in use today is the Universal Product Code (UPC). It is used in general merchandising by the food industry and industrial warehousing applications. But, remember, the DOD is just beginning with the implementation of the 3-of-9 bar code.

Background

In September 1976, under the leadership of Mr. Jack Bartley, Office of the Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics (OASD(MRA&L)), a LOGMARS Joint Steering Group was formed to investigate and recommend a standard bar code for DOD use.

The Steering Group established two LOGMARS objectives. First, establish a standard machine-readable symbology to be marked by commercial vendors and DOD activities on items, unit packs, outer containers, and selected documentation. Second, establish procedures by which use of the symbology could be employed. These objectives would avoid the proliferation of different symbologies within the DOD and eliminate duplication of effort in implementing the automated marking and reading technology. The long-range objective remained the improvement of productivity, timeliness, and accuracy in DOD logistics, thereby reducing costs.

The Joint Group was not without problems and OASD placed the following constraints on the developmental effort. Use of the recommended symbology must allow incorporation into existing logistical automated systems and not constitute a separate system in itself. Research and development efforts were not to be a part of the LOGMARS project, instead state-of-the-art equipment was to be used for all automated marking and reading applications. Commissary stores and the Armed Forces Exchange (AFEX) systems were considered unique applications and not within the scope of the LOGMARS project. Bulk petroleum, oil and lubricants, nuclear ordnance, and personal property household goods, unless they were in the transportation cycle, were also exempt from the study effort. Finally, after four years of intensive investigation and testing, OASD(MRA&L) approved the 3-of-9 bar code as the DOD standard symbology on 9 October 1980.

What is the 3-of-9 bar code?

The 3-of-9 bar code is a machine-readable linear bar code in which five bars and four spaces are arranged in various ways to represent any of 43 different characters (0 through 9, A through Z, 6 special characters, and a space). Above or below the machine-readable bars is the human-readable data element (Figure 1). The bar code is read by a laser scanner or a light emitting pen that is sensitive to variations in the light and dark areas. The bar-coded data element can be as long as 32

characters (only a practical limitation) with a start/stop mark and clear or blank space at both ends. The data element can be read right to left or left to right. The 3-of-9 bar code is self-checking, inasmuch as it must contain an exact number of spaces when a given number of bars are read and vice versa. If the scanner reads an incorrect number of bars for the number of spaces read (or vice versa) or if the read data element does not begin and end with a start/stop mark, then a "no read" condition exists. With good quality marking, it is said that first read rate is near 100% and the character substitution (misread) rate is less than one error per 6,000,000 characters read. However, less than desired printing quality or label condition quickly degrades the first read rate, but the character substitution (misread) rate is affected only slightly. The 3-of-9 bar code, in particular, is a self-checking, discrete, flexible code preferable to other bar codes for logistics applications.

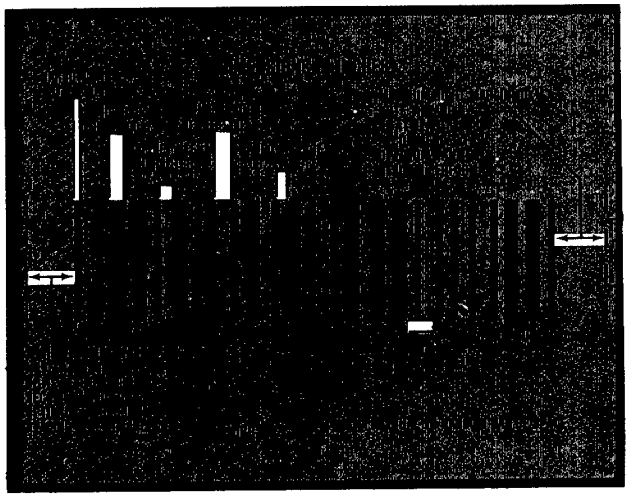


Figure 1: Standard code, 9.4 characters per inch density (enlarged).

What is OCR-A?

Optical Character Recognition, Font Style A (OCR-A) is another machine-readable symbology. It consists of machine and human-readable alphanumeric text that contains up to 92 characters (0 through 9, A through Z, a through z, and 30 special characters). Specific applications of equipment limitations may dictate the use of the full OCR-A character set. This code is read by a gun-type scanner among others (emitting multiple light sources) that is sensitive to the predesignated standard OCR-A character set and font. The data element must have a clear or blank space at its beginning and its end. The data element may be read right to left or left to right; however, there is no self-checking capability as with the 3-of-9 bar code. Furthermore, character substitution errors can only be eliminated through a combination of scanner logic routines, print quality, and contrast. As scanner logic routines are tightened to reduce substitution errors, the first read rates tend to drop. Those standard office typewriters which use font elements can produce OCR-A merely by using the correct type element. For example, retail merchants use the OCR symbology to improve their point-of-sale processing in many of today's clothing stores.

What advantage does machine-readable marking have?

The main source of error in the supply system is human error. With machine-readable inputs, human error is reduced and the time-consuming method of converting eye-readable data to punch cards is eliminated.

Can the same marking be used in nonautomated as in automated systems?

The markings used in LOGMARS are labels that use a 3-of-9 bar code with human readable above or below the bar code. The eye-readable portions are prominently placed in convenient locations. The machine-readable portions are not required to interface in any way with nonautomated operations.

Which data elements might be required for DOD marking?

A partial list of data elements that are being considered for marking within the DOD supply system is shown below. However, discussions are still being conducted since this area appears most fertile for major changes.

National Stock Number (NSN)
Procurement Instrument Identification Number (PIIN)
Unit of Issue (U/I)
Quantity (QTY)
Condition Code (C/C)
Transportation Control Number (TCN)
Port of Debarkation (POD)

The LOGMARS Test Program

Prior to initiating its test program, the LOGMARS Steering Group developed functional and cost/benefit analyses of logistics functions. In this way, they determined where to test and then prepared detailed test plans for each candidate functional area to be tested. Both laboratory and prototype test programs were developed to evaluate the capabilities of using not only the symbology but also using methods to measure paybacks of automated data entry versus present manual methods. Laboratory tests were conducted using both 3-of-9 bar code and Optical Character Recognition, Style A (OCR-A), in three areas; i.e., testing prototype equipment, printing on documentation, and printing the different symbologies directly on packaging materials. On the other hand, prototype testing of the 3-of-9 bar code was only conducted in the functions of shipping, wholesale receiving, wholesale inventory and location survey, ammunition segregation and inventory, service store issue, retail receiving, and maintenance parts tracking. In this manner, the LOGMARS test program provided sufficient evidence that the 3-of-9 bar code could be effectively employed by operating personnel. Furthermore, in the functional areas tested, bar-coding not only reduced processing time but provided an intangible benefit of increased accuracy and efficiency. The success of these test programs led DOD activities to other pilot applications for use of the 3-of-9 bar code. For example, areas such as property accountability, shipment sorting, document control, and weapons accountability have been tested by DOD activities outside the LOGMARS program and proven to be successful areas for bar-coding applications.

Synopsis of Test Results

The 3-of-9 Bar Code Laboratory Test. This test evaluated the readability of the 3-of-9 bar code on all parts of the DD Form 1348-1A (DOD Single Line Item Release/Receipt Document). The bar code was printed directly on the form with a dot matrix printer and readability tested with four different light pens and a laser-based symbol analysis device. Test results indicated that bar codes printed with a dot matrix printer had unacceptable read rates on carbon copies three through six of the DD Form 1348-1A. It was recommended that different types of printing processes be evaluated for printing bar codes on all parts of this form.

OCR Laboratory Test. This test was run in two phases at the Air Force Logistics Management Center. The first phase was to gather performance data on a prototype handheld, nonportable, alphanumeric OCR-A reader. The second phase test was to determine the readability of both OCR-A and the 3-of-9 bar code produced by a dot matrix printer on pressure-sensitive adhesive labels and white bond paper. In the first phase, the prototype OCR-A reader worked well enough to recommend that a limited field test of OCR-A symbology be conducted in an operational environment. In phase two of the test, the dot matrix printer produced an OCR-A symbology with significantly less read acceptance and read integrity than the OCR-A symbology produced by impact printers. The test conclusion indicated that dot matrix printers should not be selected over impact printers for printing a symbol code on labels and tags if one has an alternative of selecting the more expensive impact printer.

Substrate Laboratory Test. This was a joint Army/Navy test effort. It examined the readability of the 3-of-9 bar code and OCR-A printed directly on 10 different packaging substrates commonly used by DOD. The test substrates were subjected to various environmental exposure tests and read with six different pieces of scanning equipment. Results indicated that both the 3-of-9 bar code and OCR-A can be printed directly on packaging substrates and successfully scanned. However, maximum bar reflectance and minimum background reflectance values need to be established and methods of protecting bar code markings from harsh environments should be developed. An expanded test program to cover additional types of substrates and environmental tests was recommended and approved. Results of this testing should be published in the near future.

Wholesale Receiving Prototype Test. This test was conducted in the depot receiving operation at Warner Robins Air Logistics Center (WR-ALC). Receipts from Defense Depot Ogden, UT (DDOU), had a bar-coded customer receipt card attached to the materiel. Vendor marking of receipts from procurement was simulated by producing bar-coded labels when the materiel was received and attaching them to the DOD Form 250 (Material Inspection and Receiving Report). Materiel was scanned on-line and the data transmitted to the IBM 360/40 host computer. Test results indicated that the equipment is capable of operating in a warehouse environment with no equipment failures, and one can expect only minor problems to occur with the readability of the bar-coded labels. Most important, the cost per transaction to process a receipt can be reduced by 38%.

Wholesale Shipping Prototype Test. This test was conducted in the mechanized packing area at DDOU and involved items being shipped to WR-ALC. A bar-coded, special purpose document was used in the picking and packing functions at DDOU and a bar-coded customer receipt card was provided to WR-ALC. Scanning the bar-coded data automatically generated a packing list at the time the test shipment was packed. The test proved that bar-coded, specialized, single-part documentation can be used effectively to ship and receive DOD materiel in lieu of the current DD Form 1348-1. In addition, the documentation can accompany materiel through shipping and transportation systems and be successfully scanned by the receiving activity. Use of bar code scanning in the shipping function resulted in an overall 9.5% improvement in processing time.

Inventory and Location Survey Prototype Test. This test was conducted at the DDOU and utilized portable bar code scanners downloaded from the computer to prompt operating personnel to the proper storage location. Bar-coded labels on the locations, a "menu" scan board, and key entry on the portable scanner provided the means of capturing inventory/audit data. Three thousand storage locations at DDOU, including bin, rack, bulk, and outside storage, were used for the tests. Test benefits included improved data accuracy, decreased processing time for data reconciliation, and a 6% productivity improvement in data collection.

Depot Level Maintenance Prototype Test. This test was conducted within the Directorate of Maintenance at San Antonio Air Logistics Center (SA-ALC) and involved the routing of materiel through depot maintenance processes for refurbishing and reassembly into an end item. Items were accompanied by a bar-coded work control document which was scanned when the item entered and left each work center. This procedure updated the computer base and provided information on location and status of the item. Test results indicated that the accuracy of management information data due to scanner input versus manual input increased significantly. Based on this test, the technology is being implemented at all five Air Force Logistics Command (AFLC) depot level maintenance functions. Planned completion date is April 1983.

Wholesale Disposal Prototype Test. This test is being performed at DDOU to determine the operational and economic feasibility of using OCR-A symbology in a field environment. Property disposal data is printed in OCR-A on the DD Form 1348-1 with a typewriter or dot matrix printer. The OCR-A coded document is then placed with the materiel at time of issue from DDOU, thus permitting the machine-readable data required by the Property Disposal Office at Hill Air Force Base to complete physical receipt of the item. Test results will be published at a later date.

Retail Receiving Prototype Test. This test was conducted at the Class IX warehouse of the 122d Maintenance Battalion, 3d Armored Division, US Army Europe. A bar-coded label containing the required receipt data was produced at New Cumberland Army Depot (NCAD) and affixed to each unit pack destined for the test site in Germany. At the test site, the bar-coded label on each unit pack was scanned and receipt information transmitted to an on-site computer for later entry into the retail receipts processing system. Test results indicated that the 3-of-9 bar code proved to be a fast and reliable means of input for posting retail receipts. The test equipment proved to be durable and reliable in an adverse warehouse environment with no equipment downtime recorded during the test. It was recommended that the amount of bar-coded data necessary for posting receipts be reduced and that bar code scanning be made a means of data entry for posting receipts at Army retail activities.

Service Store Issue Prototype Test. This test was conducted in the Base Service Store (BSS) at Ogden Air Logistics Center. Installation of Electronic Point of Sale (EPOS) equipment in the store provided the capability to mark all items with 3-of-9 bar-coded labels for use in all sales and inventory within the BSS. The use of the EPOS equipment eliminated the need for sales cards and the key-in entry of transactions. Test results indicated that scanning equipment can be interfaced with the store computer, which results in reduced processing time in the BSS. The test is being continued with the goal set to establish a fully implemented system for BSS issue and inventory. Additional testing of the EPOS is being conducted at Eglin AFB, Florida.

Ammunition Segregation/Inventory Prototype Test. This test was conducted at Concord Naval Weapons Station (NWS), California, and consisted of labeling all ammunition in storage with the 3-of-9 bar code and then scanning magazine by magazine to accomplish a wall-to-wall inventory. This created a complete inventory file. Bar code scanning was then used to update the system in lieu of preparing punched data cards. Test results indicated that optical scanning of bar-coded information was a practical and economical method of conducting inventories of conventional ammunition. Physical

inventories could be conducted using bar code scanning at one-fifth (20%) the cost of conducting conventional inventories of the same materiel.

Cost Benefit Analysis Results

The total estimated annual Department of Defense tangible savings for the use of bar code scanning, in lieu of conventional data entry methods, is $113.9 million. As significant as the tangible productivity savings are, major intangible savings will also accrue to logistics systems. For example, fewer corrections and reruns, reduced order and shipping time, reduced inventory levels, accurate inventories and audits, and fewer training requirements resulting from the reduction in documentation should easily prove the most important long-run saving.

Contractor Markings

The contractor marking program began on 1 July 1982. To initiate contractor markings on unit packs and outer containers, two military standards are needed. MIL–STD 1189, Standard Symbology for Marking Unit Packs, Outer Containers, and Selected Documents, was developed and MIL–STD 129H, Marking for Shipment and Storage, was updated (both dated 4 Jan 82). Air Force logisticians should note that although bar coding is authorized "when specified" in MIL–STD 129H, Air Force policy requires bar coding for all items of supply except those items that are determined to be too small to apply the code, items that do not have a national stock number, foreign military sales items, multi-packs, or items going directly into a base/installation and not entering a DOD supply system. If an item is not going to be scanned, then it is not required to be bar coded.

What is to be marked?

Any or all of the below may be symbol-marked depending on the DOD function, location, and system implementation time.

Item of Supply - Any item identified to a National Stock Number (NSN). For example: One box with a dozen pens, a plastic bag containing one electronic circuit board, or one 10-pound box of nails.

Unit Packs - The first grouping of items of supply identified by an NSN, nomenclature, quantity, and unit of issue. For example: A unit pack with 12 boxes each containing 12 pens, a unit pack with 6 of the same electronic circuit boards, or one 10-pound box of nails. In this last instance, the pound box of nails is a unit pack and an item of supply.

Outer Container - An exterior container that is used for shipping either similar or unlike items. Examples might be: One outer container with 25 gross of pens, an outer container that has 6 electronic circuit boards and a bag of resistors, or an outer container that holds twenty-five 10-pound boxes of nails.

Air Force Implementation Planning

HQ USAF issued a LOGMARS Program Management Directive, L-X 2068(1), on 15 March 1982. This Directive established the bar-coding technology program and outlined how it would be implemented within the Air Force. AFLC was designated the responsible command for development, initial acquisition, and implementation for the Air Force. The individual MAJCOMs and SOAs were given the responsibility for a follow-on replacement or upgrade program. The Secretary of Defense placed the LOGMARS program under the DOD Economy and Efficiency Initiatives. OASD also provided the DOD community Productivity Enhancement Capital Investment (PECI) funds for initial implementation in FY83 with follow-on funding to be provided by the Air Force.

An initial meeting of command project officers was held 27 and 28 April at AFLC, and detail planning is now underway. With the fast-moving technology of today, it is possible that bar-coding will experience many technological improvements very rapidly. There are some risks with this program, but good program management and aggressive participation in developing functional applications will ensure successful implementation.

The Future

Application of the bar-coding technology in logistics functions will increase productivity, improve efficiency and effectiveness, and provide cost-avoidance savings that will enable our logistics systems to be more responsive to weapon systems management needs. The applications tested have barely scratched the surface; LOGMARS potential is unlimited. The concept of a paperless, fully automated wholesale and retail stock control and distribution system which includes data capture systems using wands to capture bar codes is very feasible. Soon, key-punching of data will be a process of the past. Documentation improvements and administrative control innovations will be rapid and numerous.

Picture, if you will, all mobility items having an assigned bar code and once scanned, an operator being able to automatically prepare the load list and packing list. Conceptually, all loads could be replanned and repalletized below increment level during a deployment, if and when airlift availability becomes a problem. In essence, aircraft deployment times could be reduced and in turn provide substantial productivity savings to the loadmaster.

The bar-coding technology can also be used in a forward deployment area that has no host computer support. For example, data can be directly linked to a diskette and held until computer support is obtained.

The future of the bar-coding technology in the year 2000 is indeed bright. With the recent introduction of artificial intelligence applied to computers, we will witness a move to a second computer age. Tasks that were once thought to require human intelligence for decision making will be performed by these new computers. For example, diagnosing lung diseases, locating mineral deposits, and deciding where best to drill oil wells are tasks now being performed by computers using artificial intelligence. It is only a matter of time before these "thinking computers" will open up awesome new areas for logistical applications. Bar-coding will assist these innovations and result in productivity savings that will allow the logistical management complex to remain resource lean, yet more responsive. By the year 2000, we will see radically altered logistic systems due in large part to the technology advancements that bar-coding introduces.

CURRENT RESEARCH

Air University Logistics Research in the PME Classes of 1981-82

The logistics related research papers and projects completed by the students of Air War College and Air Command and Staff College during the 1981-82 academic year are identified below.

The Society of Logistics Engineers' Logistics Award was presented in the Air War College to Lt Col Larry J. Goar for his paper, "The United States Loses Millions in Precious Metals Annually," and in Air Command and Staff College to Major Thomas E. May for his paper on "Operating and Support Cost Estimating—A Primer."

Air War College

"The United States Loses Millions in Precious Metals Annually" - Lt Col Larry J. Goar

"The Ground and Flight Risk Clause: Is It Necessary?" - Lt Col Francis Sabo.

Air Command and Staff College

"The Trade Agreements Act of 1979—New Problems for the DOD Acquisition Process" - Major Lawrence H. Baker

"Handbook for Operating Command Integrated Logistics Support (ILS) Personnel" - Major Anthony Deascanti

"Sensitivity Testing of Dyna-METRIC" - Major Wayne T. Graybeal

"Multiyear Weapons Procurement: An Imperative for Sound Management" - Major Robert E. Hergenroeder

"Operating and Support Cost Estimating—A Primer" - Major Thomas E. May

"Corrosion: A Formidable Air Force Enemy" - Major Larry G. McCourry

"Incentives for Defense Contractor Capital Investment Programs on Negotiated Contracts" - Major Edward F. McPhillips, Jr.

"Leverage Leasing—A Way to Increase DOD Airlift Capability" - Major Thomas J. Stephenson

"Development of the Quality Circles Automated Information System" - Major Todd B. Stewart

"Evaluating the Effects of Quality Circles on the Quality of Work Life in Air Force Organizations" - Major Todd B. Stewart

Loan copies should be available by the end of the summer through the Air University Library, Interlibrary Loan Service (AUL/LDEX), Maxwell AFB, Alabama 36112. Additional information on the ACSC studies can be obtained through ACSC/EDCC, Maxwell AFB, Alabama 36112 (Autovon 875-2483; Commercial 205-293-2483).

Most Significant Article Award

The Editorial Advisory Board has selected "The Challenge for Logisticians—The Future" by Lt Colonel Marvin L. Davis, USAF, as the most significant article in the Summer 1982 issue of the *Air Force Journal of Logistics*.

Productivity Enhancement in a Headquarters Logistics Organization

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Abstract

This article describes a Survey Feedback *process implemented in a DOD headquarters logistics organization. The process was then studied to determine its effect on productivity and quality of work life. The design of the research consisted of administering a presurvey and postsurvey to two groups of workers: one receiving survey feedback and the other serving as a control group. It was hypothesized that the survey feedback group would improve significantly in a number of areas, including job satisfaction, organizational climate, perceived productivity, job feedback, and employee perceptions of management. T-tests for matched pairs and simple t-tests were used to test the hypotheses. For the survey feedback group, statistically significant increases were observed in perceived productivity; but, due to a lack of supervisory support, improvements were not found in other hypothesized areas. However, one survey feedback group supervisor did enthusiastically support/participate in the process, and his work group realized significant improvements in all eight areas.*

Introduction

Typically, attention is usually directed toward the first-line production level for the implementation of most productivity enhancement initiatives. "That is where the payoff is," so it is thought, and "that is the best place we will be able to measure its effect." While there is some truth to this contention, the authors challenge the traditional inclination to exclude from consideration the great grey amorphous mass of middle management when it comes to enhancing productivity. Perhaps nowhere is this inclination more pronounced than in the DOD logistics community where literally millions of man-hours are invested in the overall logistics mission, with much of that in the middle areas.

There *are* then productivity enhancement processes which *by design* have applicability to any level in the organizational hierarchy. *Survey Feedback* is one of these.

Survey Feedback is an organizational development (OD) technique that attempts to increase an organization's ability to perform its tasks and meet its goals (17:29) by seeking to change individuals and their interaction processes (3:314; 16:523).

Survey Feedback involves systematically collecting data, analyzing the data, feeding the data back to organization members, interpreting the data, and designing actions for the resolution of the problems surfaced in the data (3:152; 12:177). Survey data provide the basis for discussion and analyses of problems which may exist in a work group (18:499). As the group members participate in feedback meetings, they contribute their own observations, uncovering areas that may require further attention (18:501).

During action-planning sessions, which follow the feedback sessions, the members of the work groups design action plans which they believe will lead to the resolution of the problems. The intent of *Survey Feedback* is to provide valid information and to encourage organizational members to act on documented problems at the most appropriate level (3:155; 17:108). *Survey Feedback* can be instrumental in establishing or revitalizing much two-way communication within an organization, and it can be used to establish responsibility for task performance to designated levels within an organization. *Survey Feedback* is a highly desirable behavior modification technique because it is a cost-effective means of implementing a comprehensive program (3:156), and it offers low personal risk for individuals (17:110). This widely used OD technique is based on theories involving feedback and participative decision making.

Background

Survey Feedback is based on the following assumptions dealing with human behavior and feedback:

(1) Human behavior is goal-seeking or goal-oriented.
(2) Confrontation and resolution can enhance collaboration.
(3) Participation in decision making can lead to increased commitment.
(4) Sharing information can be valuable (3:156).

Through *Survey Feedback,* organization members are confronted with differences in beliefs, feelings, perceptions, expectations, values, and norms. Removing obstacles to growth and learning involves surfacing and addressing these differences (3:113). Once these differences are confronted and discussed, the group is ready to participate in making decisions.

Incorporated in the *Survey Feedback* technique is Curt Lewin's theory that individuals taking part in a decision are more likely to execute the agreed-upon course of action than individuals who did not participate in the decision-making process (18:500). Goal-seeking, collaboration, and commitment are all vital to the success of the process. However, the process of sharing the survey data can also be valuable. Nadler says that by providing a group with information (survey data), it can be cued to problems in its human system, it can learn new ways of dealing with these problems, and it can be motivated to improve its functioning in the future (12:178).

Researchers have found *Survey Feedback* to have different effects in different organizations. Mann discovered that it caused significant positive changes in employee attitudes and perceptions (9:611). He also noted that the greater the involvement of the member, the greater the change in that member's group (9:612).

Brown found that feedback meetings substantially improved the level of participant involvement (2:706). Both the content of communications and the relationships among the communicators seemed to improve through the mutual sharing of information (2:707). He found that feedback meetings are not only a source for validating the information, but they also lead to positive changes in participant involvement (2:710). Miles also found that interpersonal relationships and communications improved (10:466).

Bowers compares six different change processes and *Survey Feedback* appeared to be the only one associated with substantial improvement in the organizational climate variables (1:21). Nadler and Pecorella concluded from their study of feedback and team-building sessions that:

> . . . long-lasting change can only be effectively brought about when the changes are accepted and owned by all those in the organization who are affected by new programs, including supervisors (13:362).

Their work was effective at the line production level with resultant increases in performance and satisfaction (13:354). At the supervisory and technical employee level, role ambiguity and dissatisfaction developed as they felt their traditional roles and decision-making prerogatives were being invaded (13:362).

In Hautaluoma and Gavin's study of *Survey Feedback,* the most compelling findings had to do with positive changes noted on the measures of job attitude (6:488). The findings by Kimberly and Nielsen revealed that:

> . . . the organizational participants perceived greater levels of thrust and support in the target subsystem, conflicts were handled more openly, and the skills and resources of the participants were more fully utilized. In addition, they saw greater opportunities for autonomy and self-direction (7:196).

Hand, Estaffen, and Sims found that as a result of the *Survey Feedback* process, absenteeism declined and team members were more attentive at meetings. Functioning more as a cohesive unit, the team members began to identify and resolve problems and showed more job satisfaction (5:339).

Nadler cites Coughlan and Cooke and their very structured *Survey Feedback* program which had significantly more positive results, including changes in decision-making structures, increased organizational health, changes in individual perceptions of decision-making processes, and more favorable individual attitudes toward the work environment (12:181). Nadler came to two general conclusions:

(1) *Survey Feedback* has positive effects in some situations and under certain conditions.

(2) The process of collecting, analyzing, and using the data is an important determinant of the nature and extent of the effects (12:128).

Solomon found that if the organizational climate was poor, the subordinates tended to report that something had happened in their work group due to manager feedback sessions. The data also suggested that the presence of forceful subordinates may motivate managers to use *Survey Feedback* information. Solomon noted that the process tended to have its greatest impact in those situations in which it appeared to be most needed (15:591). Solomon concludes that ". . . *Survey Feedback* would appear to be a suitable OD technique to choose for organizations in serious trouble (15:592)."

Frye, Seifert, and Yaney discovered that performance, measured by productivity (output), improved after meetings were held to develop objectives, to assign priorities, and to build family teams (4:302). Although the second round of survey data was not complete, the authors offered the following observations: communications improved, goal clarity improved, team work increased, and expectations for better leadership and information increased (4:306).

Lloyd conducted a *Survey Feedback* process within a military organization and noted that:

> . . . with the exception of self-perceptions of productivity and the quantity and quality of communication, every dependent measure either declined (as most did) or remained static (8:174).

The data suggested, however, that the climate in this organization was in fact deteriorating, a condition present before the process was begun.

Pasmore and King summarize their findings as follows:

> . . . in terms of improving employee attitudes, the method of intervention used makes little difference. In terms of improving productivity however, the method of intervention appears to be critical (14:456).

While there was no improvement in productivity when the *Survey Feedback* process was used (14:464), they felt that it did help to build trust and understanding in the organization, thereby creating a foundation on which to intervene in other ways (14:468).

Miller concluded from his findings that:

> . . . systematic efforts by managers to keep in touch with their employees' feelings, hopes, disappointments, and frustrations, if coupled with a sincere willingness to take necessary and feasible corrective actions, should help them gain further use of the skills, talents, and enthusiasm of their employees (11:10).

The Research Setting: Methodology

The experiment* was conducted within a Department of Defense logistics headquarters. The organization studied employs 635 civilians and 93 military personnel with an annual payroll of 27 million dollars. The primary responsibility of this organization is to establish plans and make policy in the area of logistics operations.

The Intervention

A new member of the organization wrote a letter to the civilian senior executive of the organization describing problems he had encountered and stated that ". . . unless these problems are confronted and handled the system will continue to be ineffective." Among the problems he identified were low morale, poor communication among employees, outdated management techniques, and no structured training program for new employees. The executive appointed the new member as the chairperson of a committee to investigate programs to enhance the effectiveness of the organization. The committee approached a consultant and, after a diagnosis of the organization, a *Survey Feedback* process was suggested. The consultant then met with the executive and a plan of action was developed.

In January 1981, the consultant conducted two days of off-site training for supervisors. Skills were built in understanding the data, feeding back the data, and conducting participative action-planning meetings. The presurvey results were given to the appropriate supervisors, and they then conducted initial feedback sessions and action-planning sessions with varying

*This paper was adapted from an AFIT Master's Thesis by Capt John D. Fiorini, entitled, "An Organizational Assessment: A Pilot Study To Determine If A Survey Feedback Program Produced Needed Changes In An Organization." (Thesis Number LSSR 55-81, Sept 81.)

degrees of adherence to the prescribed schedule. Supervisors were requested to hold action-planning meetings with their work groups every other week. Because of higher priority work loads; conflicting TDY schedules; apathy; and, in some cases, outright distrust or opposition, the action-planning meetings were often not conducted according to schedule, or not at all.

The consultant conducted refresher training with all but one of the supervisors in May 1981. The purpose of this meeting was to review the program and to offer an opportunity for the supervisors to air their positive as well as negative perceptions.

Variables

Twenty variables (Table 1) were measured in this research using a survey instrument called the Organizational Assessment Package (OAP). With each administration of the survey, full participation of members of the survey feedback and control groups was encouraged. The surveys were supported by the civilian senior executive, but it was made clear that individual participation was voluntary. It was also made clear that individual responses to the surveys would remain anonymous and would not be reported in the results; that survey results for work groups would not be shared with anybody outside that work group; and that only aggregated data would be presented to the civilian senior executive and his staff. Additionally, the authors conducted in-depth interviews with key personnel.

Table 1

Measures Tested

1. *Job Performance Goals*
2. *Task Characteristics*
3. *Task Autonomy*
4. *Work Repetition*
5. *Job Desires*
6. *Job Related Training*
7. *Performance Barriers/ Blockages*
8. *Management - Supervision*
9. *Supervisory Communications Climate*
10. *Organizational Communications Climate*
11. *Pride*
12. *Advancement/ Recognition*
13. *Work Group Effectiveness*
14. *General Organization Climate*
15. *Job Related Satisfaction*
16. *Skill Variety*
17. *Task Identity*
18. *Task Significance*
19. *Feedback from Job*
20. *Organizational Job Index (OJI)*

The presurvey (baseline measure) was administered in November 1980. Out of a possible 229 employees, 191, or 83 percent, responded to the survey. The survey feedback and control groups had a participation rate of 77 and 88 percent, respectively.

The postsurvey contained the same 120 items as the presurvey with the addition of questions to determine if the respondent took the presurvey and if action-planning meetings had been attended during the interim. The postsurvey was administered in June 1981. Out of a possible 229 employees, 129, or 56 percent, responded to the postsurvey. The survey feedback and control groups had participation rates of 63.5 and 51 percent, respectively.

The Research Design

The experimental design for this research was constrained to a large extent by the senior executive. The executive's objective in this research was to run a pilot program within the organization and then to expand the program if it proved successful. The executive selected both the group that would receive *Survey Feedback* (the survey feedback group) and the group that would not receive *Survey Feedback* (the control group).

Analytical Procedures

T-tests for matched pairs, which control the differences between the survey feedback and control groups, were used to test for significant changes in the survey feedback and control groups from presurvey to postsurvey. Simple t-tests were used to test for significant differences between the two groups at postsurvey time. For these tests, 11 work groups were selected from the control group and 8 work groups were selected from the survey feedback group.

Results

Out of the 20 measures tested, the survey feedback group increased significantly in the areas of job feedback and work group effectiveness, whereas the control group decreased significantly in the areas of performance barriers*, OJI total score**, pride, and work group effectiveness. Furthermore, a significant difference existed between the survey feedback and control groups at the postsurvey in the areas of job feedback, OJI total score, task autonomy, work group effectiveness, and performance barriers. In every instance, except performance barriers, the survey feedback group scored higher than the control group. Furthermore, the survey feedback group improved (although not significantly) on 14 other measures, whereas the control group improved on only 2 other measures. With respect to work group effectiveness, the *increase* in the survey feedback group and the *decrease* in the control group emphasize the effect of *Survey Feedback* on this measure. It is also interesting to note that on the presurvey the control group was significantly better. This reversal of the survey feedback group from being significantly worse to being significantly better adds further support to the conclusion that *Survey Feedback* can be a powerful process.

In order to further investigate the effect of *Survey Feedback*, a work group (from within the survey feedback group) that complied faithfully with the rigor of the process was compared to the overall survey feedback group. This "example" work group improved significantly more than the survey feedback group in the following areas: skill variety, task significance, job performance goals, advancement/recognition, supervisory communications climate, organizational communications climate, job related satisfaction, job related training, and performance barriers. This is a verification of Mann's discovery that the greater the involvement the greater the change.

*A decrease in performance barriers is an improvement.
**Organizational Job Index.

These results must be taken with caution due to the sample size and the sampling method; however, they do indicate that, for those work groups receiving survey feedback, there was a statistically significant increase in work group effectiveness and job feedback. The members in the survey feedback group perceived an increase in the quantity and quality of their output. They also felt that they were better able to handle high priority work and use available resources more efficiently. The opinion of their work group as a working unit in comparison to similar work groups also increased.

Conclusions

This research provides evidence that the *Survey Feedback* process had a statistically significant effect within the survey feedback group on work group effectiveness and job feedback. Indirectly, this research also indicates that the process contributed to the maintenance of a constant measure in the areas of OJI total score and pride, whereas the control group declined in these areas. For reasons unknown to the authors, the control group did improve in the measure of performance barriers.

The *Survey Feedback* process studied in this research eliminates many of the assumptions involved in other survey feedback models. By requiring reports, the consulting team can know that every work group in the survey feedback group is or is not holding the data feedback session. Thus, the consulting team can also keep track of how the program is progressing. The team is cognizant of whether the action planning sessions are or are not being held according to schedule, since each work group is required to submit a report subsequent to each action-planning meeting. The quality of the meetings can also be determined by what is written in the reports.

Supervisory commitment and sincerity in this research were ostensibly poor throughout the program. Most of the supervisors gave the process a very low priority. Out of all possible 170 required reports, 120 were not received at all; and, of those received, most were received late.

In response to our queries, some of the first-level supervisors indicated there was no commitment at their level to the survey because there had been no commitment at the upper levels of the survey feedback group. The executive of the survey feedback group was one who himself had not submitted any of the required reports and who had in fact attended very few of the required meetings. Consequently, there was a great deal of apathy among the supervisors and some considered the program as just another ploy to manipulate them.

As an indication of the positive effects survey feedback can have in a logistics organization, it is interesting to compare the results of the survey feedback group as a whole to that of the one group whose supervisor did demonstrate a commitment to the program (i.e., the "example group" referred to earlier). Out of a possible ten reports, this supervisor submitted all ten. As was noted in the results section, his work group's skill variety, task significance, job performance goals, advancement and recognition, supervisory communications climate, job-related satisfaction, and job-related training scores increased significantly in comparison to the total survey feedback group. In addition, the performance barriers score decreased significantly in comparison to the total treatment group.

In discussions with the senior civilian executive and with the supervisor of the survey feedback group, they felt that no "new information" was found in the presurvey data. The senior civilian executive refused to believe, in some instances, what his employees were telling him.

Recommendations

First level management support. It is the authors' belief that the limited success of the *Survey Feedback* process was due, in no small part, to the poor support the survey feedback work groups received from their management. As was noted earlier, most work groups did not meet as scheduled nor did they problem-solve around issues of importance when they did meet. A resounding exception to this was the "example group" cited earlier wherein the supervisor provided a measure of support and enthusiasm that was contagious. As a result, he and his employees enjoyed significant improvements in both their work and their work environment. A positive attitude such as this from *all* work group supervisors may very well have resulted in a truly successful program *throughout* the organization.

Executive level management support. In order for a positive attitude to prevail throughout the organization, upper level management must also demonstrate a commitment to the program. The executives must themselves participate and demonstrate some interest (i.e., conduct feedback and action-planning sessions with their immediate subordinates). They must provide prompt review of action plans requiring their attention/referral. Additionally, the executives ought to make the program an agenda item at all staff meetings. They should also attend as many as possible action-planning meetings of their immediate subordinates, review their action plans, and enforce suspense dates. When the lower level supervisors witness a true commitment among the upper level supervisors, they in turn grasp this commitment.

Survey Feedback is one of many productivity enhancement tools available to improve a logistics organization; however, if it is to work best, it requires strong commitments throughout the organization.

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The Military Leader - A Manager of People

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The Setting

In the normal functioning of military organizations, the leader is never successful alone. He acquires his reputation through success or failure in marshalling the efforts of many people and focusing them on the unit mission. The determinant then of military leadership is inherent in the individual's ability to lead people. All other aspects of organizational functioning have little significance unless this ability is demonstrated extensively.

A style of leadership is tremendously influenced by that individual's particular feelings about people. The adopted and accepted style of the leader exerts tremendous influence on the behavior of the people being led. If he feels people are responsible, he will encourage their efforts and they will respond positively. If, on the other hand, he feels people are no good, his negative feelings will produce unfavorable reactions. In brief, leadership is a relationship which exists between two people which involves their personal feelings.

The same style of leadership, or the same technique of influence, will not be equally effective for all people or in all situations. The effective leader is that individual who acquires the ability to "read" and evaluate a situation, knows the people, and responds to both in a straight-forward manner. The leader recognizes there is a real difference in what his job should be and what the other person's job should be. This permits him then to structure his own behavior as required by the situation and the people involved. In other words, the leader's style and application of technique must be sufficiently flexible to accommodate the group's needs and expectations.

Throughout recent history, military leaders have contributed immensely to management philosophy and theories of technique. Their more recent contributions have been implemented worldwide in areas of systems management, matrix organization, project management, personnel training, quantitative techniques, operations research, and inventory management. In return, military leaders have liberally borrowed concept and philosophy from contemporaries in the non-Government enterprises.

Military organization history also reflects both give-and-take in management. No military leader in today's Department of Defense should feel he cannot benefit from the work being done by outside sources, such as reported research, expository articles, or accounts of successful and unsuccessful techniques or processes.

"American military leaders have been, and are, effective."

The Dilemma

An *effective* leader is not necessarily *efficient.* He may be gauged a success based on results when in reality only a casual measurement of cost has been attempted. When cost measurement is also used to determine success, the leader must show cost-effectiveness and evaluate his leadership actions to include both effectiveness and efficiency. In the military environment, effectiveness is the driving feature; it should be—for national survival. American military leaders have been, and are, effective. This is evidenced by our continued existence as a society and source of world influence. The efficiency of military leadership, however, might well be—and has indeed been—often questioned, which is also understandable. The military leader has not historically been financially responsible, nor did we expect him to be, for his decisions.

The military leader, except for those few in systems or project management, seldom has decision prerogatives to make about mass dollar expenditures on weapons systems, support equipment, or support facilities. Unless he is in procurement or in a major supply acquisition job, he seldom decides on inventory, item selection, or dollar expenditures. However, it is true that at unit level many decisions can and do affect the purchase of inventory or equipment; and it is also true there is growing financial consideration in routine noncombat military affairs. But, the largest and most expensive military resource is manpower which is largely controlled by unit level leadership and its decisions. Little cost consideration is given this resource or its use; military labor is, for all practical purposes, free. It would seem that the management of people has less real consideration given it than does the management of dollars, inventory, facilities, or equipment. A leader may be severely reprimanded for the loss of equipment (or its misuse) but will rarely be counseled if a person is "lost" or misused. For this reason, plus the feeling of inadequacy to lead people, the military leader often gives little priority to the need for improving his real ability to manage people. Many of those leaders do in fact belittle the teaching of "people-aspects" theory in management and leadership courses at the various DOD schools.

". . . military labor is, for all practical purposes, free."

The Bare Bones of Leadership

If the human resource then is the determinant for leadership effectiveness, and if the human resource is the largest and most expensive resource available to the leader, the reluctance to efficiently manage people is hard to

understand. Instead, I submit that the improved use of people should be major personal goal of every military leader.

A Basic Philosophy—Involvement

Doing a consistently good job of managing people is not accidental. It requires considerable effort, real interest, a lot of time, and a willingness to share. The leader's outlook must permit him to constantly change because every interpersonal contact offers that possibility.

Successful management of people then is an exercise in involvement. On the opposite pole, detachment is not a stepping stone to success even though it may sometimes be a worthwhile device or tactic. Most of the time the leader must be involved with his people to help them improve their ability to perform on the job. This demands his commitment to helping subordinates grow in competence, in ability to handle responsibility, and in capability to identify needs which must be satisfied for organizational success.

Involvement dictates that the leader learn to know his key subordinates as individuals. He cannot be involved with them when he permits himself to think of his subordinates in terms of a "group." Together, of course, the individuals do form the group and the group is the basic organizational element he leads and manages. But, he will acquire his greatest success and most satisfying job performance when he recognizes his staff as individuals and works hard to relate their personal values, desires, and drives to organizational needs and group success. Unless he fulfills this responsibility, he will probably think of an individual as being "average." Such thinking eliminates the individual personality. The techniques and ideas which must accompany the "average" conception do not fit most of the people. "Average" applications will eventually increase the individual's irritation and discomfort, make him resistive, and limit his capacity to contribute to the mission.

Learning To Know Him

Since we have determined that a leader's first concern about people is to know those individuals who report directly to him, this will leave a relatively large number of people with whom he will have infrequent personal contact. However, subordinate supervisors should apply the same guidelines in their respective roles. Thus, this approach to leadership effectiveness is well within the capabilities of all responsible leaders and does not impose an unreasonable burden on one person.

The most obvious way for any of us to learn about a person is through the personnel record system. These files offer quick, basic information about a person's background, education, prior jobs, and experience. A few comments from the leader about the person's past (as gleaned from the records) will establish a rapport and show that he is genuinely interested in the individual.

Private conversations with each individual offer a grand opportunity to learn how he feels about his work, how he thinks, and how he responds to his environment. If these conversations are sincere and basically honest, the leader will recognize the effect of his involvement and also that he has established a base from which can develop empathy and understanding. He will be addressing a need, existing in each of us, for assurance that the boss is indeed concerned about making our work efforts meaningful and using our abilities and skills. These suggested conversations with subordinates should be frequent and continue throughout employment. The leader must arrange these conversations so they never give the impression they are being held "because it is time for another chat." Rather, the environment should be maneuvered so as to give a natural and spontaneous aura in which can develop an assurance of true interest. An important element should be the leader's desire to listen. The effective leader always recognizes how much true listening means to any interpersonal relationship. The next step for the true leader is to inform the other person how that person's words and actions are modifying his actions, thinking, and understanding toward him. Thus, the involvement process, and its resulting changes in the participants, will be acknowledged and recognized. Often, the other person will react in turn by revealing how the association is also changing him. When this begins to surface, the relationship will blossom with greater faith and trust. Performance and productivity are almost certain to improve, as long as the worker is certain that the leader's goals are congruent with organizational goals.

"The effective leader always recognizes how much true listening means to any interpersonal relationship."

The Leader Leads

Participation

Leaders are expected to set the pace, to provide functional participation to the group, and to contribute to the group in a way which helps make goal achievement possible. If the leader expects the people to work for goals, he must establish personal goals, clearly define the group goals, and encourage each member of the group to individually set personal goals.

Enthusiasm

Enthusiasm is a hallmark of leadership and is contagious. Problems are opportunities to the enthusiastic leader who welcomes the challenge of risk which accompanies them. He is intelligent enough to recognize, and admit, that assistance is often needed and readily seeks help from others to solve problems. He is also ready to help others, recognizing the similarities of both their needs. Thus, he leads by example with enthusiasm and eagerness.

Understanding

People work best and more cooperatively when they understand what they are expected to do and why their participation is necessary. The communicative skills of the leader play an important role in creating an atmosphere for cooperative effort. Efficient use of the human resources demands a good constructive attitude toward communication, coordination, and cooperation. The effective leader realizes this and works for two-way communication, understanding, and acceptance.

Communication

A good leader is also a part-time public relations specialist. He recognizes and publicizes worthy individual and group accomplishments. He works for his own professional development and encourages his people to do the same to obtain job satisfaction and motivation.

Loyalty

Loyalty is an essential ingredient of effective leadership. The leader must evidence his loyalty and support to his people, his boss, and his organization when they perform their

jobs effectively. These attributes are displayed when the leader makes decisions based on a sound foundation.

Expectation

Not all people will live up to the leader's expectations. He needs to recognize that sometimes a person will disappoint him. Often, natural rivalry will encourage one individual to overextend and create a condition in which he cannot perform as expected. Other times an individual, for various reasons, will not perform as the leader expects. The leader must accept this probability of failure and be prepared to deal with it in a mature fashion consistent with the situation and the person.

Detours

Error and failure are human frailties the leader must cope with in himself and others. Continuous perfection cannot be achieved, so the leader must accept that he will err and others will do the same. However, error and failure should not be condoned, but must be accepted as probable. Therefore, a situation exists in which the leader must define for himself the fine line dividing honest error/failure and inadequate performance. When this is done, the leader will establish an atmosphere in which his people will feel free to fail. That phrase, "feel free to fail," might be taken by some as a license to looseness, but it is not so intended. When the leader displays the courage to allow such a feeling, the people are encouraged to react to the situation and act in accordance with their intelligence and experience. They are, in this environment, more apt to succeed than fail because they no longer fear error and no longer feel the leader will act against their error with punishment. Rather, they recognize, even though not consciously, that error will be a learning experience for themselves and the leader.

The Leader Helps

Cooperation

The effective leader helps his people realize and use the talents and abilities of the other people of the unit. A cooperative approach to unit success is created and no one need feel he is alone in efforts to succeed. In defense organizations, such an environment is vital for mission ability because today's sophisticated weaponry has made the one-man victor highly improbable. Rather, military missions today are successfully accomplished only through the cooperative use of the skills of many directed with coordination for a common purpose. The skill of the leader instilling an active cooperation becomes a significant determinant for consistently successful unit performance.

Conflict

The leader helps his people understand that the varieties of backgrounds in the group will cause some ideological conflict which should be used for the common good. Progress is usually sparked by such conflicts if the participants realize that there is normally more than one way to "skin a cat." Such acceptance paves the road to intelligent judgment of the other person's point of view. It also offers a logical means by which the opinions of all may be altered until agreement is reached. This form of confrontation with understanding is dynamic and innovative. It offers the group a wider range of alternatives for problem solution.

Constraint

Dedicated people want to grow in knowledge, experience, and ability. The effective leader helps his people by urging them not to constrain their healthy curiosity by artificial barriers of a formal organization chart. The leader encourages people to accommodate their curiosity, stretch into new experience areas, and enhance their understanding of the needs and accomplishments of others united with them to attain common organizational objectives. Communication is facilitated, coordination is made more likely, and cooperation is more likely to come from this involvement.

"The leader encourages people to accommodate their curiosity . . . ."

Coping

Success invokes change. Change can be frightening or disturbing when people do not understand what results are likely when deviation from a familiar course is suggested. This appears to hold true even though we have all been exposed to constant change throughout our lives. Despite the constancy of change, and the normal desire to improve, an organization seems to desire to retain the status quo. Inconsistent as this may be, the leader must still cope with it. Simultaneously, he must cope with the need for and problems of change and help his people adopt and accept changes. The successful organization dynamically functions within a framework of constant change. Each job performance, every conversation, and each ideologic conflict alters the capacity and capability of the persons involved. This changes the organization. Such change must be expected as must be the change resulting from the outside world's technology and its cultural, economic, and social stretching. No person or organization can be fully protected from these stimuli. Military organizations are likely to feel even more of this change impact because of the transiency of population and the ever-present pressures of urgency brought about by world politics and mission emphases. For these reasons, the ability of the military leader to help his people adapt to change becomes very significant for the unit. He cannot afford to be overly sold on the established routine of requirement, process, or procedure. Instead, he must adopt the philosophy of grace—progress is impossible without change, so change should be a graceful and beneficial process.

The Final Word

The military leader is not successful alone. He needs and relies upon the efforts of other people to accomplish the unit mission. Accordingly, the military leader must provide himself a conscious program aimed at knowing his people and how best to use them in current and projected situations. It should be emphasized that the leader's efforts to better use his people must not be left to chance. He may over time become quite proficient by random situational learning, but this is likely to be an expensive and disappointing process. Therefore, the leader needs a purposeful effort to learn and to apply this knowledge to the task of people management—a task that can be physically and tangibly rewarding when done well and successfully.

Quality Circles: A New Style for American Management

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Introduction

Everywhere around us is evidence of a major economic blight. Unemployment is up, factories are closing, businesses are failing, and productivity— the relationship of output to input—is down. From the realization of this dilemma has grown a feverish search for solutions, the "magic recipe" needed to revitalize America and put our economy back on its feet. Not all countries seem to share our dismal course. Japan's economic success has been of particular interest, since she has "moved to the second largest economy outside of the communist bloc." (4:22)

Japan's success has sent scores of American companies scurrying for the "Japanese equation." One of the early conclusions has been that "their dedication to quality is a prime factor in their productivity improvements." (12:22) Also has come the understanding that large capital investments are not a panacea for curing productivity ills. "The next productivity improvements have to be much broader based with the support and involvement of every employee if our efforts are to be successful." (2:449)

A logical outgrowth of this activity has been the discovery of a Japanese management concept hailed as "the heart of the Japanese effort." (5:59) This concept is known in Japan as "JISHU KANRI" or "JK" and in the U.S. as "Quality Control Circles" or "Quality Circles." So enthralled have U.S. managers been with this concept that "dozens of American companies are quickly adopting them." (6:1)

Quality Circles—Issues and Answers

What are quality control circles?

As stated by one skeptic, quality control circles, or "quality circles," are "nothing more than a 'sewing circle' on the assembly line." (11:35) This description is not far off as quality circles involve "little more than just getting together folks who do similar work and giving each a say on common problems." (11:35)

A more fitting definition for QCs is a group of employees from the same work area who do similar work, who meet regularly to identify and analyze work related productivity and quality problems, and who develop and implement solutions. Initially, QCs were limited to hourly wage earners; however, in the U.S. adaptation has been expanded to include technical and staff personnel within both the public and private sectors. (4:40) The size of a circle ranges from approximately 5 to 20 people, although the usual size is about 10. The participants are volunteers who receive training in problem identification and resolution. (14:9) Approximately four to eight hours of such training is provided to all circle members. (1:108) The circle leaders, or "coordinators," are provided additional training, primarily in group dynamics. The most involved training is reserved for the person who functions as the overall QC organizer for the company or organization. This person, sometimes termed a "facilitator," may receive from several days to two or more weeks of specialized training, with emphasis on QC organization, behavioral sciences, and group dynamics. (13:12) In the U.S. Air Force, specialized facilitator training is available through an Air Force Institute of Technology course, QMT 082, Principles and Techniques of Quality Circles Management.

Quality Circle members not only identify problems but also play a large role in their resolution. Consequently, because their ideas are recognized and acted on, participants have a greater feeling of contributing to the organization's success. "A U.S. study shows that the most common worker's complaint is that supervisors fail to listen when workers propose better ways of doing their jobs." (13:12) "Our whole managerial philosophy for the past several centuries has been built on the notion that people are like children, incapable of directing their own activities within the organization, incapable of controlling and disciplining themselves." (10:13)

What is the origin and application of quality circles?

Japanese quality in manufactured goods was extremely poor after World War II. Seeing this problem, in 1948 General Douglas McArthur helped to arrange for a U.S. Government statistician, Dr. Edward Deming, to visit, evaluate, and then train the Japanese people in quality control techniques. He accomplished this task so well that, in 1951, the Japanese honored his services by establishing the Deming Prize award which is presented to the company selected as having achieved the highest level of quality. (8:8)

In 1954, Dr. J. Juran, a noted quality control expert, delivered a series of lectures in Japan. He emphasized the merit of institutionalizing quality control as an integral part of management functions. "In practice, this meant teaching quality control to middle management." (4:22) Here is where the Japanese contributed a major innovation. They interpreted Dr. Juran's teachings to mean that every person in the organizational heirarchy should receive exposure to statistical quality control knowledge and techniques. In effect each worker, in concert with work mates, was expected to take responsibility for solving quality problems. Quality control was no longer the sole prerogative of outside engineers with limited shop experience—it was the responsibility of all employees. Quality training became the subject of not only textbooks and formal courses, but of special radio and television lectures between 1956 and 1961. Finally, in 1962, the journal, *Quality Control for the Foreman,* was introduced. Since foremen were often workers themselves, it was befitting under the Confucianist doctrine (4:22) for them to extend this learning down to the worker level. This began a movement of ideas from the 'bottom up' rather than top-down edicts by management. (7:14-16) From this beginning the number of Japanese quality control circles grew, roughly from 80,000 members in 1966 to an estimate of "over one million quality control circles in Japan today with over ten million members." (14:9)

Another factor behind the growth of Japanese quality control circles was the environment of expanding postwar economic growth. Japanese managers were especially willing to invest in education and training for workers. However, in the United States, "employers were more likely to see hourly rate

employees as interchangeable parts, particularly in the context of a large army of reserved unemployed." (4:26) Additionally, America was undergoing a "boom time malady—a U.S. economy so healthy that poor management habits were ignored." (6:12) The result has been catastrophic. "During the past 10 years, 19 nations surpassed the U.S. average annual productivity growth rate, which is less than 2.5 percent. Japan led this growth with an annual increase of nearly 10 percent." (8:1) The Japanese themselves are convinced that much of their success has stemmed from quality control circles. A key official at the Productivity Center in Tokyo "estimated that in Japan between twenty and twenty-five billion dollars is saved every year as a result of the creative activities of Quality Circles." (8:3) Note that the exclusive use of the circles to control quality has given way to the much broader charter of increasing productivity. "In practice, the emphasis on productivity has played a more prominent role." (4:26-27)

Will quality circles work in the United States?

Antagonists to the use of Japanese management techniques in the U.S. are quick to point out "decisive" differences in our two cultural settings. Among the differences peculiar to Japan are: (1) lifelong employment, which fosters a deeper worker—employer commitment; (2) the Japanese practice of management by consensus, which naturally promotes group participation in quality circles, and (3) the fact that many, if not most, Japanese workers receive a substantial bonus geared to company profitability. Thus, it is held that this system, girded by a highly disciplined labor force and a number of social reinforcements (company songs, recreational programs, and yes, even quality circles) all contribute to make Japan one, unique homogeneous society. As one opponent says, "In short, to imitate the Japanese, we would need a labor force disciplined by a social hierarchy and controlled by an oligarchy." (3:53) Furthermore, U.S. managers are indoctrinated in turn-of-the-century ideas popularized by Frederick W. Taylor as "scientific management." Interpretations of Taylor's ideas in practice today are that "we all know managers plan and workers do what they are told. Engineers design and production people build. Managers would not be managers if they were not smarter than workers, and so on." (14:12) Therefore, one could conclude that either the QC concept is unworkable in the United States, or its adoption must be accompanied by major readjustments in our work ethic.

Dr. Juran feels that the three conditions necessary to successfully adopt circles in the U.S. are "awareness of need, atmosphere of collaboration, and acceptance of change." (9:18-22) At the time of his article (November 1980), Dr. Juran felt that U.S. managers were not aware of the need for improved quality; there was an adversary relationship between management and workers; and both management and unions were reluctant to change. Since that time, however, there have been some major changes. First, the sharp downturn in the U.S. economy is reshaping the thinking of American management. This is exemplified in a statement by a leading corporate executive: "We have been concentrating more attention on people participation in the process of identifying job related problems." (12:21) Second, unions have changed. This is evidenced by recent announcements of rollbacks in union wage scales and in the negotiation of profit-sharing arrangements geared to future profitability. In short, America's economic plight is leading management and workers to seek mutually beneficial solutions to company problems. Also, we are beginning to see an awakening of a new quality consciousness. This is quite visible in the automotive industry where one of the "big three" is now advertising that "quality is job one." Therefore, the three prerequisites cited by Dr. Juran are well on the road to fulfillment.

Some American companies have already adopted QCs with measured success. Moreover, the media now speaks of an awakening of American managers to the hidden potential revealed by quality circles. For instance, "Fairchild management and supervisors alike claim to have discovered incredible amounts of talent on the line." (15:95-99) Perhaps even more revealing has been the Japanese experience with its U.S. production facilities. Sony, which has plants both in the U.S. and Japan, notes "U.S. workers are the equal of Japanese when they are dealt with fairly." (15:95-99) Consequently, the argument that QCs are unique to the Japanese culture and cannot be exported to the U.S. is without empirical support and should be challenged.

Conclusion

The enormous potential of QCs is well established. What remains is to recognize the major obstacle to their success in the United States. The problem lies in the basic distrust between American managers—middle managers—and workers. That management is principally at fault is supported by Dr. Deming who "frequently notes that 80 percent of all quality and productivity problems are caused by management actions, not by the work force." (14:11)

As noted earlier, the current state of economic austerity is forcing changes in attitudes. These changes are in turn bringing about a new spirit of cooperation and a greater awareness of the untapped storehouse of creativity within the U.S. worker. QCs, properly adapted and applied, have the potential to unlock much of this storehouse. However, "if one could say that their major contribution was to convince American management that (hourly-rated) workers do have an important contribution to make to the organization and are prepared to do so when given the opportunity, then the (QC) innovation will have had a lasting impact in America." (4:42)

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Resistance to Change

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Abstract

Individuals and organizations develop change psychologies. Some overwhelmingly encourage and endorse all change as progress; others do just the opposite. Here the author expands upon his ideas of resistance to change so as to better help you understand your own change psychology. Organizations need an organized response and healthy discipline to properly handle change. Understanding resistance is a first step.

Change is a way of life. It occurs everywhere and no one is immune to it. It may sometimes not be noticed, but it occurs even when one argues that it is not occurring. Changes that escape observation do so probably because they are not visible to you through your "notice of exceptions" window. Individuals establish a notice of exceptions span through a phenomena termed parameters of interest. It adjusts as your interests vary, but it may also in fact be adjusted by someone else attracting your attention to his specific interest. Sometimes a special charismatic occurrence can change your entire interest pattern. However collected, the elements of information you then consider are screened, measured, accepted, or rejected according to your personal needs. But . . . this procedure occurs constantly, whether you are functioning as the observer or the doer in a scene, regardless of your degree of awareness.

Subsequently, we assume a role in those changes we become aware of, whether we are the target audience or the participator. If a change actually occurs within our interest span, it is then assigned a standing in memory recall and our attention may return to more pressing matters. If the change remains a proposal and does not immediately succeed, it becomes an offer that may have been countered for some reason or other. If the proposed change is not immediately successful, or is countered by an alternative, the procedure of change, in itself, becomes the focus of interest until the proposal is either implemented or discarded. The reason for a strong interest may be that the continuing effort required to *achieve the change* or *to discard it* required strong, persuasive efforts. The additional work may reinforce the interest and may create a new sensitivity through an expanded parameter of interest.

Resistance to change is a response we sometimes assign to the opposing party's behavior if it touches and irritates our sensitivity. It is a response—a form of conduct—that is familiar to all of us. What is your general recollection of the impressions you had when you observed resistance? If you were involved in a role in the change proposal scenario favoring its implementation, your views were probably different than the views of persons in opposition. Your views could hardly be considered unbiased. If you become emotionally involved, it is unlikely that you could present an impartial, equitable appraisal of the response. On the other hand, if you were not emotionally involved, but remained objective, you should be in the unique position of being able to examine and analyze the other's response and then using that reaction to aid in the reinforcement of your objective achievement plan.

"Resistance to change is a response we sometimes assign to the opposing party's behavior. . . ."

"Resistance to change creates a differing view, depending on one's position in the matter."

To determine how this can be done, let us start by examining the environment surrounding the typical situation. Assume at the outset that the facility setup is proper and that duress is absent. Then, in this atmosphere, a change is proposed which results in an outcome somewhere between immediate acceptance and implementation on the one hand, and lengthy, drawn-out rejection and possible discard on the other. As noted in earlier paragraphs, if the result is the former, the parties pass to more urgent matters. If not, some form of counter communication arises and the procedure slows down to allow for reconsideration of the countering efforts. One of those efforts is resistance, and it connotes terms such as presenting opposition or delaying and impeding further consideration. However, change by definition implies a dynamic effort concerning a deviation from the status quo. Resistance to change creates a differing view, depending on one's position in the matter. Impressions will range across the spectrum. The changer is more likely to view any resistance in the negative sense. This is the view that appears typical and this perception, in turn, defines the characteristics of the resistor as unfavorable, usually in terms such as reluctant, short-sighted, or stubborn. Customarily, a perceived threat to one's security is generally assumed the principal cause for resistance; and this it may be. However, from that point, the characterization and motivation to resist may become deeper and darker, although in reality there may indeed be sound and logical reasons for the resisting action. This type of resistance, if encountered, may become very intense, seem unreasonable, and be most difficult to surmount. It is the kind one seems to remember most.

The described situation presents one scenario showing only a side of the initial encounter. Let us carry through the transaction and determine if resistance to change then continues or gradually disappears. What does in fact occur when the original changer is faced with a counter proposal such as an alternative or rejection of his plan? This is not unusual and it may occur as often as not. The conduct of business today is full of such transactions in contracting, union negotiation, and organizing. These actions all involve *alternatives to* or *rejection of* change proposals. The size of the

parties or their identities may differ, but the change procedure remains the same. Government actions involve similar transactions, as do international commercial affairs; and all of the possible ramifications in controversies and views may be present. Imagine the range of arguments that arise when the establishment of an international standard is contemplated. All such examples, as well as many others, are conducted in an atmosphere of consideration and reconsideration as the action flows to and from the participants.

To reduce as much of this as we can to some common ground, let us examine the simple, yet complex, reaction that comes when a proposer or changer presents a change or an offer. In turn, the other party presents an acceptance, alternative, or rejection of that offer. If the first or last reaction is proffered, the matter is over, with regard to the change proposal, and overt resistance to change should disappear. If overt or covert resistance remains, supervisory action should halt it, for it is at this point that serious organizational harm may be done by a reluctant staff member. There may be disagreement about the imperiousness of that statement, but what is meant is that the rebellious action should be eliminated. If an alternative plan is offered (in Contract Law, this is termed a counter offer), the negotiation begins. This reverses the roles wherein the initiating changer becomes the changee and now has the role responsibility to consider a change initiated by the other party. If resistance is offered and another alternative is suggested, the roles may change again. This may go on and on, a common procedure in the conduct of business, and a useful practice. There is a large body of civil laws applicable should parties finally have to resort to litigation. Reaching this stage involves resistance of the type that apparently cannot be overcome unaided. This type of resistance obviously is firmer than any mentioned before. If current events are any indication, such resistance may be very determined. The courts of our country all have huge backlogs of these types of civil litigations. It is the contention of this article that this second scenario occurs at least as often as the first, but, for some reason, does not create the same impression on the resistor. This may be due to opposing parties, each negotiating or bargaining for some advantage. However, the resistance is there, nonetheless, and is just as determined, if not more so, as in any other change situation.

"People do change their perceptions of methods to achieve objectives."

The results of often-countered or stalemated change proposals frequently lose the original identity of the initiating parties, but the original theme resistance to change of the resistor is not lost. Roles become clouded and intermingled, but their objectives do not. People do change their perceptions of methods to achieve objectives. Sometimes, however, a compromise may be reached and a so-called optimum solution is achieved. Much bargaining is accomplished this way. This, however, does not always result in an altogether suitable solution, for each party may have obtained only a part of what it wanted but still has strong reservations about what it did not receive. For example, let us view employment contract negotiations and observe the obstinate actions resulting in an industrial walkout. Both sides resist further offers and a stalemate occurs. This presents a very real possibility of the loss of security to management and to the owners through loss of production, loss of security to employees, or loss of jobs, or some other effect equally as dear to each party. Both sides finally agree when some partially acceptable outcome appears or when their endurance runs out.

"The best reason for change is that the old way can no longer be afforded in terms of effectiveness, personnel, or other cost factors."

Summing up these views, resistance to change is not limited to a popular (or unpopular) belief that resistors are persons merely resisting for the fear of the loss of longstanding procedures. Underlying all resistance is an opposition, the reason for which may not be apparent. It is suggested that an examination of that reason often provides the key to unlock any resolution action for that problem. If the classic resistance occurs, we must determine the procedures which will be affected. If they are longstanding, there is probably good reason for their existence. That does not make them sacred. However, to change a method without real need is to change for the sake of change, a poor excuse for action. The best reason for change is that the old way can no longer be afforded in terms of effectiveness, personnel, or other cost factors.

Let us, then appraise opposition as a healthy, positive sign which, if approached with a wise view, may provide a means of determining terms for progress. We further realize that the results obtained reflect a dynamic alternative pointing towards an integrated objective achievement. After all, life is a compromise and change does help us in our dynamic environment.

(Precious Metals continued from page 13)

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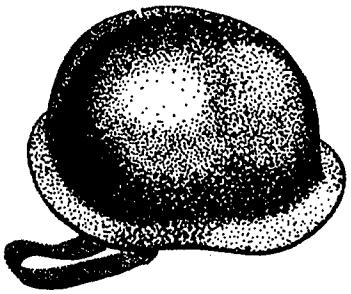

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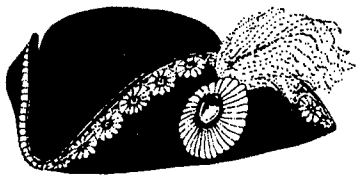

LOGISTICS WARRIORS: "A Few Remarks on Logistics in General"

"Is logistics simply a science of detail? Or, on the contrary, is it a general science, forming one of the most essential parts of the art of war? or is it but a term, consecrated by long use, intended to designate collectively the different branches of staff duty,—that is to say, the different means of carrying out in practice the theoretical combinations of the art?

These questions will seem singular to those persons who are firmly convinced that nothing more remains to be said about the art of war, and believe it wrong to search out new definitions where every thing seems already accurately classified. For my own part, I am persuaded that good definitions lead to clear ideas; and I acknowledge some embarrassment in answering these questions which seem so simple.

In the earlier editions of this work I followed the example of other military writers, and called by the name of *logistics* the details of staff duties, which are the subject of regulations for field-service and of special instructions relating to the corps of quartermasters. This was the result of prejudices consecrated by time. The word *logistics* is derived, as we know, from the title of the *major général des logis,* (translated in German by *Quartiermeister,*) an officer whose duty it formerly was to lodge and camp the troops, to give direction to the marches of columns, and to locate them upon the ground. Logistics was then quite limited. But when war began to be waged without camps, movements became more complicated, and the staff officers had more extended functions. The chief of staff began to perform the duty of transmitting the conceptions of the general to the most distant points of the theater of war, and of procuring for him the necessary documents for arranging plans of operations. The chief of staff was called to the assistance of the general in arranging his plans, to give information of them to subordinates in orders and instructions, to explain them and to supervise their execution both in their *ensemble* and in their minute details: his duties were, therefore, evidently connected with all the operations of a campaign.

To be a good chief of staff, it became in this way necessary that a man should be acquainted with all the various branches of the art of war. If the term *logistics* includes all this, the two works of the Archduke Charles, the voluminous treatises of Guibert, Laroche-Aymon, Bousmard, and Ternay, all taken together, would hardly give even an incomplete sketch of what logistics is; for it would be nothing more nor less than the science of applying all possible military knowledge."

From: *The Art of War* by Baron De Jomini.

LOGISTICS WARRIORS: An Airman on Sea Power

"A modern battleship, according to the old system of naval thought, may cost somewhere between fifty and seventy million dollars; it may require, on an average, one cruiser costing between twenty and thirty million dollars, four destroyers costing three or four million dollars each, four submarines, a certain amount of air power to protect it, and, in addition to this, great stores for maintaining the personnel of more than a thousand men and dock yards and supply facilities to keep them up. So that every time that a battleship is built, the nation constructing it is binding itself to about one hundred million dollars or more of expenditure and a certain amount per year to keep it up. Battleships have required heretofore complete replacement every few years to prevent their becoming obsolete.

As battleships and surface craft are helpless against aircraft unless they themselves are protected by air power and, as their influence on the destruction of sea-going trade is secondary to that of the submarines, nations are gradually abandoning battleship construction. Three are keeping it up: England, Japan and the United States.

England is entirely dependent for existence on her sea-borne trade; Japan, also, is dependent almost entirely on her sea-borne trade. Where England and Japan would have to protect their commerce in the Seven Seas or starve, America could entirely dispense with her sea-going trade if she had to, and continue to exist and defend herself. Where, therefore, a nation might have to expend a tremendous amount of effort and treasure on the maintenance of its sea-borne trade at great distances from home, it would be better for one not so dependent on sea-borne trade to put its national defense money and effort into active offensive equipment designed directly to defeat the enemy instead of dissipating its power in an indecisive theater.

The airman looks at the development of a country's military effort somewhat as follows. National defense consists roughly of four phases: First, the maintenance of domestic tranquillity in the country itself so that the preparation of active fighting material can go on unhindered. An army on the ground to insure tranquillity and an air force in the air to prevent hostile air raids can take care of this. Second, the protection of the coasts and frontiers. An air force can do this and fight any hostile aircraft or destroy hostile warships while its home country is policed and protected on the ground by a land force. Third, the control of sea communications. This can be done by aircraft within their radius of action and otherwise by submarines. Surface craft have a secondary value for this. Fourth, the prosecution of offensive war across or beyond the seas. This may be carried out primarily under the protection of air power, assisted by submarines and an army. A succession of land bases held by land troops must be occupied and the enemy must be attacked directly through the air. Floating bases or aircraft carriers cannot compete with aircraft acting from land bases. So that, in future, surface transports escorted by war vessels such as carried

the American troops to Europe cannot exist in the face of a superior air force. Only when complete dominion of the air has been established can a war of invasion across the seas be prosecuted under present conditions. Air power, therefore, has to be employed as a major instrument of war, no matter whether a land force or a sea force is acting on the surface of the earth."

From: *Winged Defense* by William Mitchell, Former Assistant Chief of the Air Force, U.S.A.

LOGISTICS WARRIORS: South Africa, 1901-1905

"The grand strategy to which Kitchener had now reluctantly applied himself was, in effect, Milner's strategy: to establish 'protected areas', centred on Bloemfontein, Pretoria, and the Rand, and then progressively work outwards from these areas, clearing the country of all guerrillas and restoring civilian life within them. By the end of October 1901, ten thousand square miles in the Transvaal and Northern Orange River Colony, and 4,200 square miles around Bloemfontein, had been officially declared 'absolutely clear' in this fashion.

This new policy was Milner's, the new weapons were Kitchener's. And no patent weapon could have been simpler than the lines of ordinary barbed-wire fence, guarded at intervals by homespun earth-and-iron blockhouses (costing £16 each), which had sprung up at Kitchener's command. The system had originated in January 1901 as a line of fortified posts protecting the railways. Then Kitchener had developed the network to provide a fence for the protected inner areas of the country itself. In effect, the fence lines of blockhouse-plus-wire served as a linear garrison, a low wall of high-tensile wire, in which wire and the infantryman, stretched to miraculous thinness, could fence out the mounted enemy (provided always, of course, the enemy had no field-guns—or time to use wire-cutters). Kitchener's latest step was to turn part of the system the other way about. On the periphery, the barriers served as offensive, not defensive, weapons; not as cordons to keep out the enemy, but as cages in which to trap them, a guerrilla-catching net stretched across South Africa. By May 1902, there would be over eight thousand blockhouses, covering 3,700 miles, guarded by at least fifty thousand white troops and sixteen thousand African scouts.

Already, by the end of October 1901, despite Kitchener's black moods, the blockhouse system had dramatically improved the strategic map of the war, looked at from a British point of view. The 'bag' had averaged two thousand a month since March. Natal was clear. In Cape Colony, the two thousand-odd guerrillas had been hustled into the two least important areas: the wastelands of the extreme west and extreme north-west. In the Transvaal and the Orange River Colony, the guerrillas were fragmented and powerless to attack even the most remote railway line. Most of the central parts of both new colonies were clear. The grand total of the enemy was believed to have been reduced to ten thousand, at a 'liberal estimate', in both republics."

"Obviously, it was to crush these leaders and their men that Kitchener attached the highest priority. They were not only the driving force behind the guerrilla war itself; Steyn and De Wet were believed (with reason) to be the principal obstacle to renegotiating peace on Middelburg principles. Hence the vital importance of extending the blockhouse lines rapidly in both new colonies. Progress was indeed rapid. In November, the cleared areas were more than doubled: rising from 10,000 to 14,450 square miles in the Transvaal, from 4,200 to 17,100 square miles in the ORC. Beyond this cordon, the hunted Boers would have only three choices: to try to break through the blockhouse lines, to break back through the mounted infantry pursuing them—or to give up the hopeless struggle and voluntarily pay toll to the 'bag'."

From: *The Boer War* by Thomas Pakenham.

* U.S.G.P.O. 522-015/1302-8956

LOGISTICS WARRIORS: Supply in World War II

"Automatic supply was used throughout most of 1942, but the United States began to shift to a requisition system as it became evident that unbalanced stocks and large reserves were accumulating in several overseas areas. Neither method was satisfactory in situations where there was a shortage of required items or where information was incomplete. The greatest difficulty in meeting requirements for automatic supply was in determining the strength and composition of the forces being supplied. To improve control, the War Department instituted in March 1942 a Materiel Status Report, to be submitted monthly by overseas commanders, listing quantities of selected scarce items on hand and authorized. The War Department intended the report to serve as a requisition, but, because of difficulties in eliminating overlapping reports of shortages and in correlating successive reports, the system did not work as planned.

In the fall of 1943, a new system of supply and control was adopted. It was based on the assumption that overseas supply would develop in three successive phases. During the first, all supply would be automatic. This would continue until the second phase (considered the normal phase) when procedures would become semiautomatic; the provision of controlled items and ammunition would be based on status reports, other supplies would depend on requisition. In the third phase, which was expected to occur considerably later, supply would be entirely by requisition. In actual operation, a system similar to the second phase, with both automatic and requisitioned resupply, continued in use until the end of the war. This system was not without problems. Serious discrepancies between port records and figures supplied by the theaters were common, theater inventories were seldom adequate, and the time lag made status reports out of date before supply action could be taken on them."

From: *Movement Control in Three Wars: World War II, Korea, Vietnam* by Historical Division, Joint Secretariat, Joint Chiefs of Staff.

LOGISTICS WARRIORS: Time to Improve

"First, defense efforts consume enormous quantities of scarce resources. A more efficient use of resources for defense will allow alternative uses of resources in domestic programs of government or in the private sector. Second, better planning improves the quality of advice to policymakers and sensitizes them to the nuances of alternative courses of action and their consequences. Third, to the extent that representative elements of a high-quality planning debate enter the public domain, there should emerge an enhanced political dialogue on these issues and a more thoughtful political basis of popular support for defense policies and institutions. We need to move beyond the polarization and frustration that grew from the Vietnam conflict. Fourth, high-quality planning with the longer term commitments that are possible may improve the defense resource picture. Stable expectations based on more careful commitments can produce a solid base to attract human resources and expenditure patterns which can minimize the bidding-up of program costs with crash procurement efforts. Fifth, careful planning and investment programs can help limit and perhaps reverse the decay of the industrial base. Sixth, planning in the sense of strategic management (the linking of planning-implementation-evaluation) can help convey our commitment to a steady course to our allies and uncommitted states, together with an expression of greater national will to our adversaries."

From: "On the Need to Reform American Strategy" by Edward N. Luttwak in *Planning US Security* edited by Philip S. Kronenberg.

"The primary function of an armed force is to fight in battle. This is nowadays impossible without a highly complex system of supporting activities. Among these a man may find not only the chance of self-fulfilment in a closely coherent group of human beings, where confidence is generally high and everyone receives from others what he is prepared to give. He will also be offered an opportunity for pretty nearly every pursuit that appeals to the rational man."

The Profession of Arms
Lt Gen Sir John Winthrop Hackett

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